e 1946

Chemical Industries

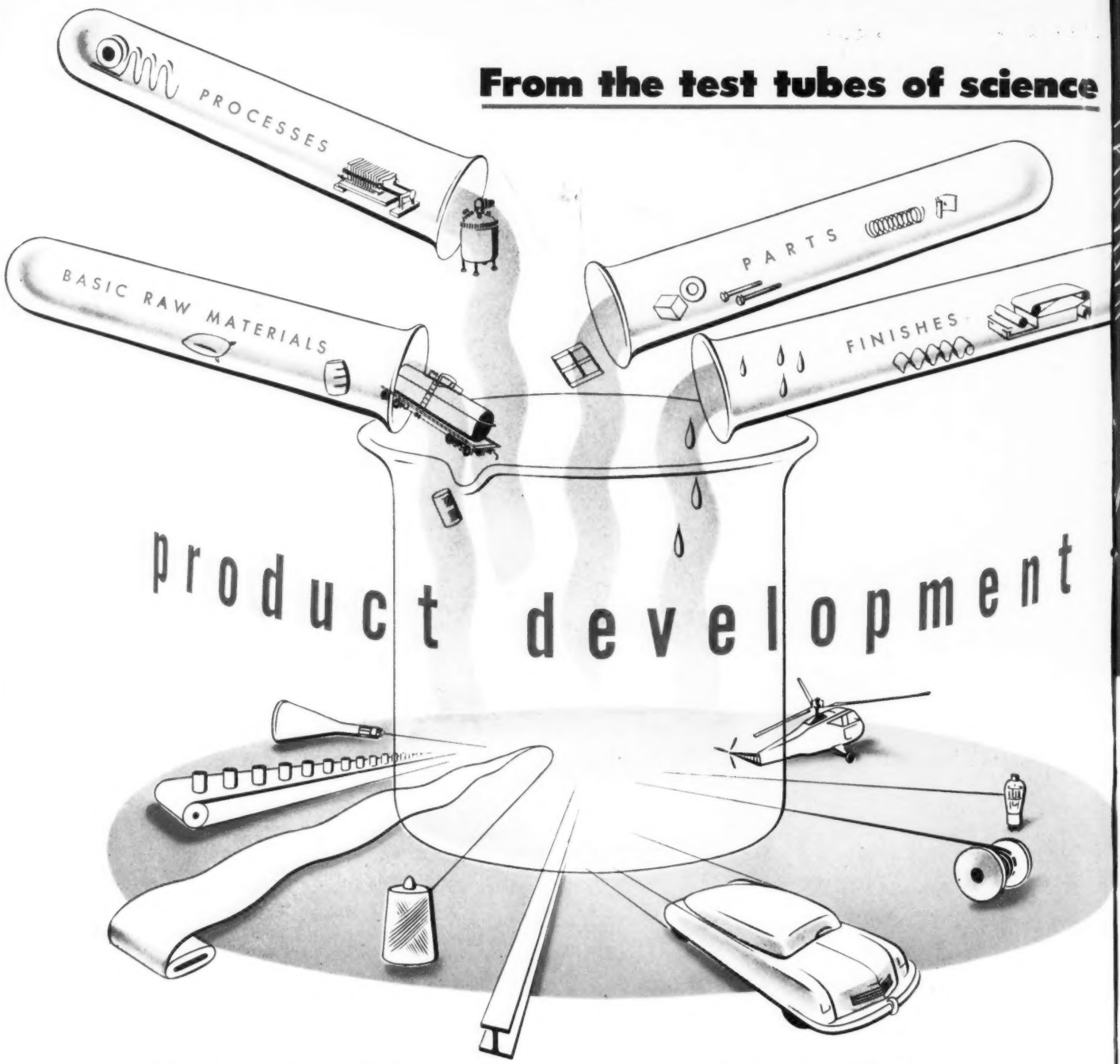
IN THIS ISSUE

Hydrogen Peroxide 957
Mini-Plant for Continuous Processes 962
Synthetic Detergents ... 964
Market Data Sources VII: FPC and NRPB 967
Design for Sanitation .. 970
Industrial Proteins 974
Why Lead Is Scarce 978
Chemical Smokes 980
Electronic Controls 982

CASEIN "WOOL"—Proteins are scaling new heights as industrial raw materials p. 974

Axis Manufacture of Hydrogen Peroxide p. 957

From the test tubes of science



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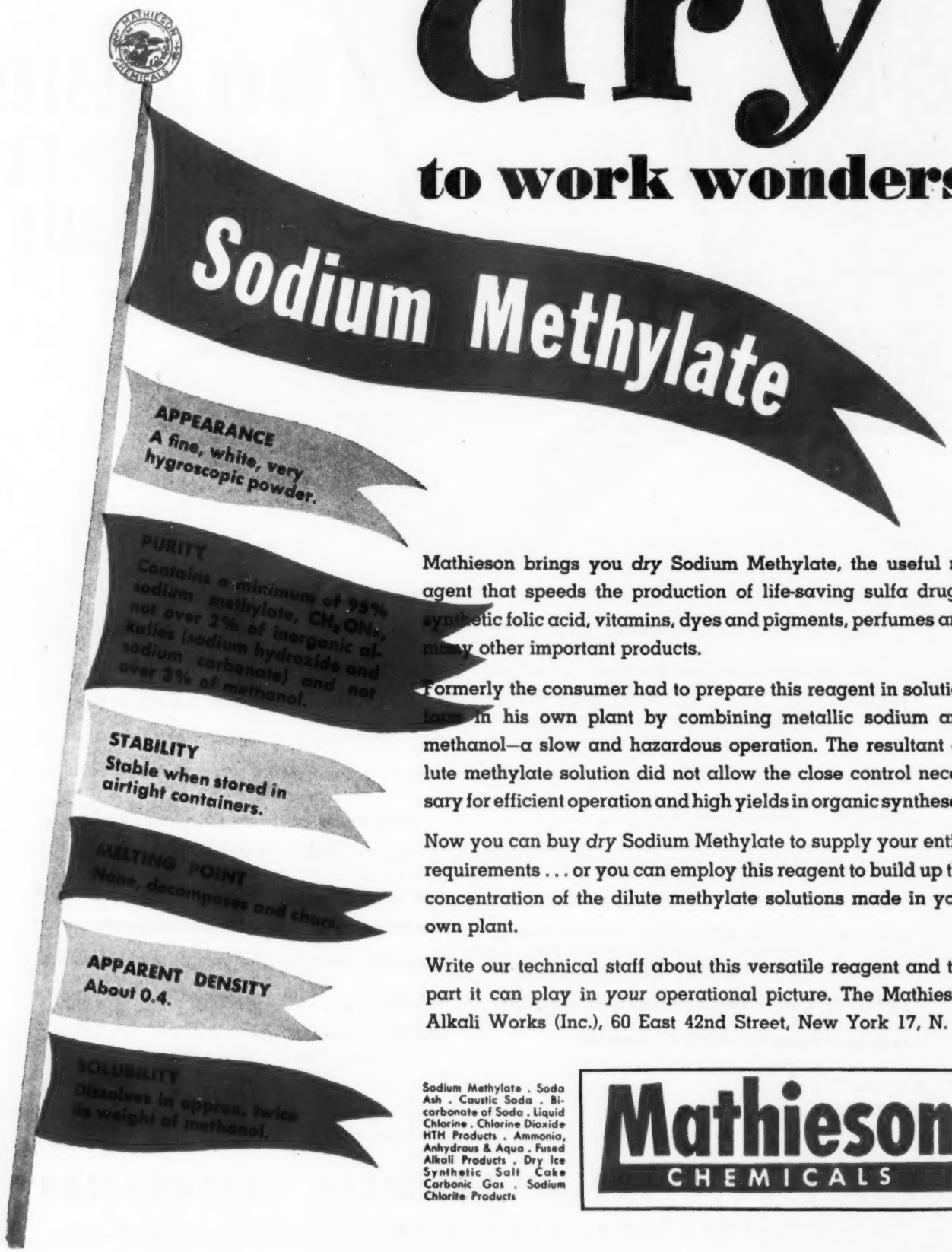
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THE CHEMICAL BUSINESS MAGAZINE

Chemical Industries

VOLUME 58
NUMBER 6

June 1946 Contents

EDITORIAL 953
AXIS MANUFACTURE OF HYDROGEN PEROXIDE . . . . . by Comm. R. A. Cooley 957
NEW MINI-PLANT AIDS IN CONTINUOUS PROCESS DEVELOPMENT . . . by W. F. Waldeck 962
WHAT'S AHEAD FOR SYNTHETIC DETERGENTS? . . . . . Editorial Staff Report 964
FEDERAL POWER COMMISSION AND NATIONAL RESOURCES PLANNING BOARD
by Richard M. Lawrence & Lawrence A. Monroe 967
PROPER CHEMICAL PLANT DESIGN IS AID TO SANITATION . . . . by Mohe H. Solworth 970
PROTEINS AS INDUSTRIAL RAW MATERIALS . . . . . by A. K. Smith 974
WHY LEAD IS SCARCE . . . . . Editorial Staff Report 978
CHEMICAL SMOKES AND SMOKE SCREENS . . . . . by Harold A. Levey 980
ELECTRONICS IMPROVES INDUSTRIAL PROCESS CONTROL
PART 2. RECORDING POLAROGRAPH, HIGH VACUUM AND pH MEASUREMENT
by Douglas M. Considine and Donald P. Eckman 982

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DEPARTMENTS

READER WRITES 908
BETWEEN THE LINES: Russian and Japanese Phosphates . . 990
BOOKLETS AND CATALOGS 1026
NEW PRODUCTS AND PROCESSES 992
NEW EQUIPMENT 1002
PACKAGING AND SHIPPING 1016
PLANT OPERATIONS NOTEBOOK 1020
INDUSTRY'S BOOKSHELF 1024
CHEMICAL ECONOMICS AND STATISTICS 1053
WE—Editorially Speaking 1070
PATENTS AND TRADEMARKS 1073

NEWS OF THE MONTH

WASHINGTON 911
CHEMICAL NEWS IN PICTURES 985
GENERAL NEWS 1029
CHEMICAL SPECIALTIES NEWS 1046
CANADIAN NEWS 1048
MARKET OUTLOOK 1050
CURRENT PRICES 1058
INDEX TO ADVERTISERS 1068

COVER: Proteins are belatedly emerging as a major chemical raw material. Here, spinnerets in the plant at Aralac, Inc., are producing a synthetic fibre from milk casein. See article on Page 974.

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THE READER WRITES

Hydrazine Hydrate Addendum

To the Editor of Chemical Industries:

The article "Hydrazine Hydrate, War Baby or New Chemical Intermediate" appearing in the March. 1946, issue of CHEMICAL INDUSTRIES is of considerable interest to me since I was a member of one of the teams which made a detailed study of the production of hydrazine hydrate at Gersthofen in Germany. The report of our team which, so far as I know, is considerably more detailed thon any previous report has been declassified and will soon be available through the Office of the Publication Board. The report is entitled CIOS Report Trip No. 215, Part 5, "Hydrazine Hydrate and C-stoff Production at Gersthofen." by J. McAuley, Daniel B. Clapp, V. W. Slater and K. A. Cooper.

In the article there are two points on which I would like to comment:

(1) The article states that hydrazine hydrate "is now being prepared commercially in the United States by the same basic process that was utilized in Germany, namely, reaction of an alkali hypochlorite with excess ammonia." It should be noted, however, that the novelty of the German process does not lie in the basic Raschig reaction, but in the fact that it is continuous throughout and leads directly to hydrazine hydrate without the isolation or formation of hydrazine sulphate.

(2) A statement is made in the article that the Gersthofen plant produced only 50 tons of hydrazine hydrate. According to information we obtained at Gersthofen, the plant produced a total of 215.7 metric tons when production ceased in May, 1945, due to the occupation by the United States Army. I believe that the statement that "little more has been made since (i. e. October, 1944) because of various troubles" is not correct because although Gersthofen never reached its rated capacity, its production figures steadily climbed from 5 tons in October, 1944, to 50 tons per month at the close of operations. The Gersthofen plant was originally intended to contain four units, each of 100 tons per month capacity, but only one unit was actually completed, and owing to the grave supply and transportation difficulties at the close of the war, it never exceeded the 50 ton output.

It should be further noted that the Gersthofen plant was a more modern plant than that at Leverkusen since the former was built as a result of the experience with the latter.

DANIEL B. CLAPP
Office of Scientific Research and Development
Washington, D. C.

The information that the Gersthofen plant produced only 50 tons of hydrazine hydrate was taken from the report by M. F. Fogler, "Production of Hydrazine Hydrate, I. G. Farben A. G., Leverkusen, Germany," Report No. 186, Office of the Publication Board, Department of Commerce.— EDITOR.

Market Data Series Helpful

To the Editor of Chemical Industries:

We have read Richard M. Lawrence's interesting articles appearing in CHEMICAL INDUSTRIES on "Information Sources for Chemical Market Research" and consider them important aids to those who look to government as a source of information for the solution of certain industry problems.

Frequently usable data compiled by government agencies are destined to limited use because, among other reasons, the public lacks knowledge of their existence. Mr. Lawrence's description of the services and publications of various Federal agencies should help correct this situation.

A. F. HINRICHS
Acting Commissioner of Labor Statistics
U. S. Department of Labor
Washington, D. C.

Classification of Data

To the Editor of Chemical Industries:

I should like to second Miss Strieby's suggestion that one of your series on "Information Sources for Chemical Market Research" be devoted to a discussion of the organization of information and the preparation of subject heading lists.

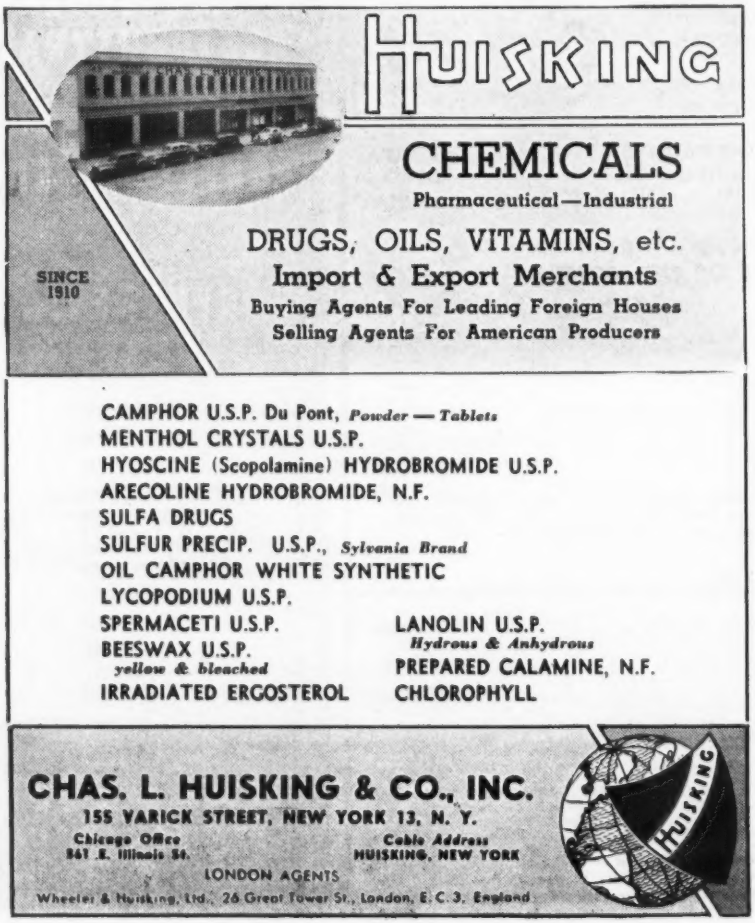
Any constructive efforts in this field would be most welcome.

H. F. MCDUFFIE, JR.
Bristol Laboratories, Inc.
Syracuse, N, Y.

To the Editor of Chemical Inaustries:

Further regarding the subject heading list for chemical market research files, please keep in mind the breakdown for finished products. It is not difficult to compile an adequate list for raw chemicals, but one does strike a snag on the manufactured products.

IRENE M. STRIEBY, Librarian
The Lilly Research Laboratories
Indianapolis 6, Ind.



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T. N. SANDIFER *reporting*

Cut Commerce Funds . . . Coal Strike . . . Natural Gas . . . Norwegian Nitrate Water Pollution Laws . . . Resin Price Ceilings . . . Pare Synthetic Fuels Budget

Commerce Plans Reorganization

CONGRESS HAS REDUCED sharply the requested appropriation for expanding the Department of Commerce. The reduction may be offset by later action, in which event the Secretary intends to proceed with a departmental reorganization in which the major emphasis will be on creation of Government facilities for scientific research in behalf of "small business" not approached by anything now functioning in the Capital.

The Secretary is preoccupied with this aspect of his Cabinet post and has confided to a small group that he feels the Department of Commerce is fifteen years behind the comparable relationship which the Department of Agriculture bears to its own field. He indicated his intention to so develop the application of what he terms "pure science" in his department, as to put it on a new plane in relation to business.

He has the highest praise for the Bureau of Standards, and it is largely through what he has said to groups close to him that the work of this bureau's top officials and scientists, in connection with application of atomic energy, has become known. He believes, however, that the department's functions in assisting business with research problems, in making scientific data in possession of the Government available, and in administering a vast body of patent knowledge, can be elaborated. His plans will bear watching, especially in connection with pending patent and government research legislation.

Coal Strike Aftermath

EFFECTS OF THE coal strike will carry through until late summer. Industrially, it was not believed likely that the pick-up would be very rapid. In the case of steel, it was pointed out that coke production and gas would have to be restored. Even with the more favorable situation of mid-May, coke output had been heavily retarded.

The annual uncertainty in coal supplies has thrown new emphasis on the possibility of using other fuels. Industry plants either acquired or expanded standby facilities during the war, to permit alternate use of fuels as one or another kind fluctuated. It is known that shortly after the coal strike began, the Civilian Production Administration, as well as private industries checked the possibility of switching to oil or natural gas as an emergency step. However, the shortage of fuel oil made this change of doubtful value in this instance.

Nevertheless, it was believed that the chances of converting the Government's surplus oil pipelines to cross-country movement of natural gas for industry and utility purposes, has been greatly strengthened.

War Assets Administration is reported to have before it a number of bids for both "Big Inch" and "Little Inch" pipelines. If Congress indicates it has no further intention of intervening in the matter, it is likely that the WAA might attempt to close a deal. Such assurance is not the case, however. Some members of Congress have intimated they might go further into the matter.

Meanwhile, Federal field men are checking on bidders, as to eligibility under the disposal act, and other respects.

Final Hearings in Natural Gas Investigation

GAS AND COAL companies are preparing for the scheduled final hearings in the investigation by Federal Power Commission of natural gas matters, in progress for the past several months. The final hearings begin June 17, in Washington.

These hearings probably will consume most of the summer, extending at least well into July. Interested parties will then have probably 60 days for presentation of summaries, although this might be held to a month. The Commission findings, embodied in a report to Congress, will be ready by the late winter. This report is expected to be more a presentation of actual findings, rather than definite recommendations for Congressional action.

One development likely to be detailed in the report is the growing rivalry of gas and coal, in which FPC has apparently shaded its policy in favor of coal. The situation was a keynote of discussions at a recent meeting of a large gas association, with the industry indicating that it is ready to push for a larger share in supplying fuel.

Interior's New Interest in Oil and Gas

THE NEW SECRETARY of Interior has been asked by the President to attempt a unification and coordination of Federal policy on petroleum matters, now more or less in diverse hands. He also was instructed to establish an agency within his department to maintain contact with appropriate State regulatory or other groups concerned with both oil and gas.

In view of the Secretary of Interior's reputation in Washington for steadiness and administrative grasp (Krug headed WPB, it will be recalled, and was favorably regarded in this job) the new assignment should be watched for more important developments.

Seized American Properties As Tax Loss Deductions?

REFERENCE HAS BEEN made in recent issues to American properties abroad which have been appropriated by one or another of the postwar "governments" set up under foreign military occupation, and some of which this country refused to recognize until recently.

The suggestion has been advanced by some United States observers that the most substantial benefit can be obtained by American owners of these German, Austrian and other properties, in merely writing them off on their tax returns, rather than attempting to get reparations.

Rubber Unit Restored at C P A

THE CIVILIAN PRODUCTION Administration has revived a Component Materials Unit, to assist in maintaining a steady flow of materials to rubber manufacturers. The unit is headed by W. R. Lantz, of B. F. Goodrich Co., who served previously in the old Rubber Bureau of WPB.

Expansion of the Technical Operations Branch of CPA's Rubber Division also has taken place recently. Its job will be to assist in reconversion problems of the rubber industry. Frederick G. Reinke, formerly a major in the Army, will specialize in natural rubber distribution to manufacturers of industrial rubber products.

Octane Rating to be Lower as Lead Conservation Step

INDUSTRY RECOMMENDATIONS for lowering gasoline octane rating to 78.5 instead of 80, in view of the sustained lead shortage, have been made to CPA. Refiners have been assured of sufficient lead for June.

Norwegian Nitrate Production Restored

WITH WAR DAMAGE repaired, Norway' nitrogen plants have resumed operations and are at full capacity, it is reported by the Department of Commerce's chemical division.

It is indicated that Norway's output of synthetic nitrates is largely intended for export. The country produces important quantities of nitrogenous fertilizers, but must import most of its requirements of phosphates and potash. One-third of domestic requirements of super-phosphates and basic slag will be produced at home, the remainder to be imported from France, Spain and Belgium. Arrangements also are reported to have been made to obtain approximately 17,500 tons of pure potash from France, Germany and Russia.

The principal fertilizer product manufactured in Norway is a mixture of calcium nitrate and ammonium nitrate, equivalent to 93,000 tons of nitrogen annually.

Tideland Oil

AN ODD SIDELIGHT in the controversy over Federal or State right to tideland oil potentials is the revelation that cooperative groups are interested in obtaining exploration rights. Senator La Follette, Wis., recently reported that 15 farmer cooperatives have filed application with Interior Department for lease and exploration rights.

Resin Prices Placed Under Import Price Regulation

EXPORT OF VARIOUS natural resins from countries of origin has been resumed, but on a price scale that has made it impossible to continue to regulate sales in this country on the former basis, says OPA.

With imports virtually at a standstill during the war, the resumption of shipments has been marked by exporters' demands which made it impossible for importers in this country to make sales under their former maximum regulation. Lack of any international control also made it impossible to effect ceilings at the source of supply. For this reason OPA has decided to revoke the maximum price regulation (No. 297) and to place price control under the Maximum Import Price Regulation.

Water Pollution Legislation Under Study

HOUSE RIVERS AND HARBORS Committee members have indicated that they will seek legislation to ban pollution by manufacturing plants of rivers and streams. Several bills, already introduced and referred to the committee, may be combined into a new measure which would authorize the Public Health Service of the U. S. to initiate suitable programs in collaboration with interested State authorities, and would provide for joint Federal-State action. A feature of a proposed draft provides for Government loans to affected industries to assist them in constructing treatment works, and in necessary engineering work. A punitive phase of the legislation would invoke court injunctions, where necessary, against pollution.

U.S. and England Lead in Fats and Oils Production

TECHNOLOGICAL LEADERSHIP in production of fats and oils has passed to the United States and England, as a result of war damage to the German industry, according to a report from abroad to the Office of Publication Board.

The German industry was cut in half by war damage and research facilities and staffs were inferior to those in the United States as a result.

Other reports recently announced by the Board cover development of low thermal plastics at MIT during the war, and a simplified method for determining the quantity of carbon monoxide in air, developed by Army Air Corps Engineers.

Synthetic Fuel Funds Denied

THE HOUSE COMMITTEE that reported Interior Department's appropriations for the coming year virtually eliminated all funds for synthetic liquid fuels. The Bureau of Budget estimate allowed $7,000,000, finally recommended $3,500,000, and the committee disallowed the entire sum. An increase of $75,000 was allowed for testing lignite and sub-bituminous coals, out of a proposed increase of $150,000.

An effort was under way on the House floor to restore some items, and it was thought the Senate might correct the House further when the bill reaches that body.

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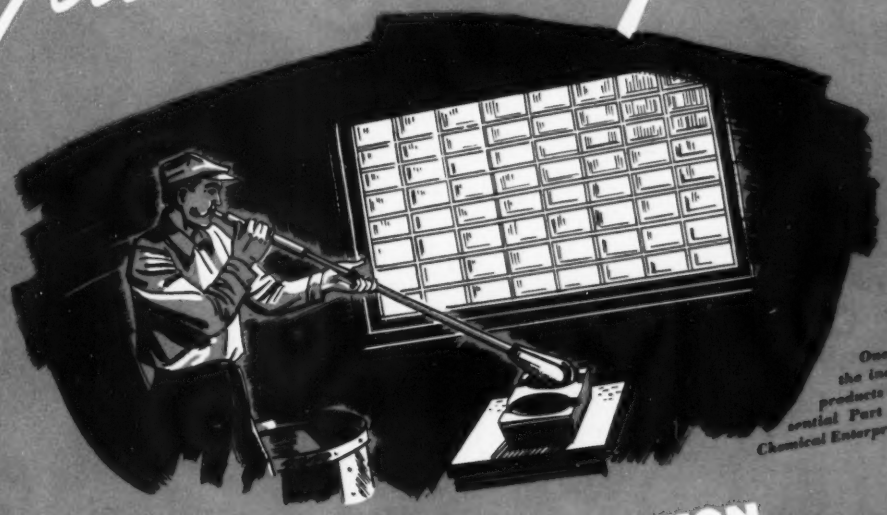

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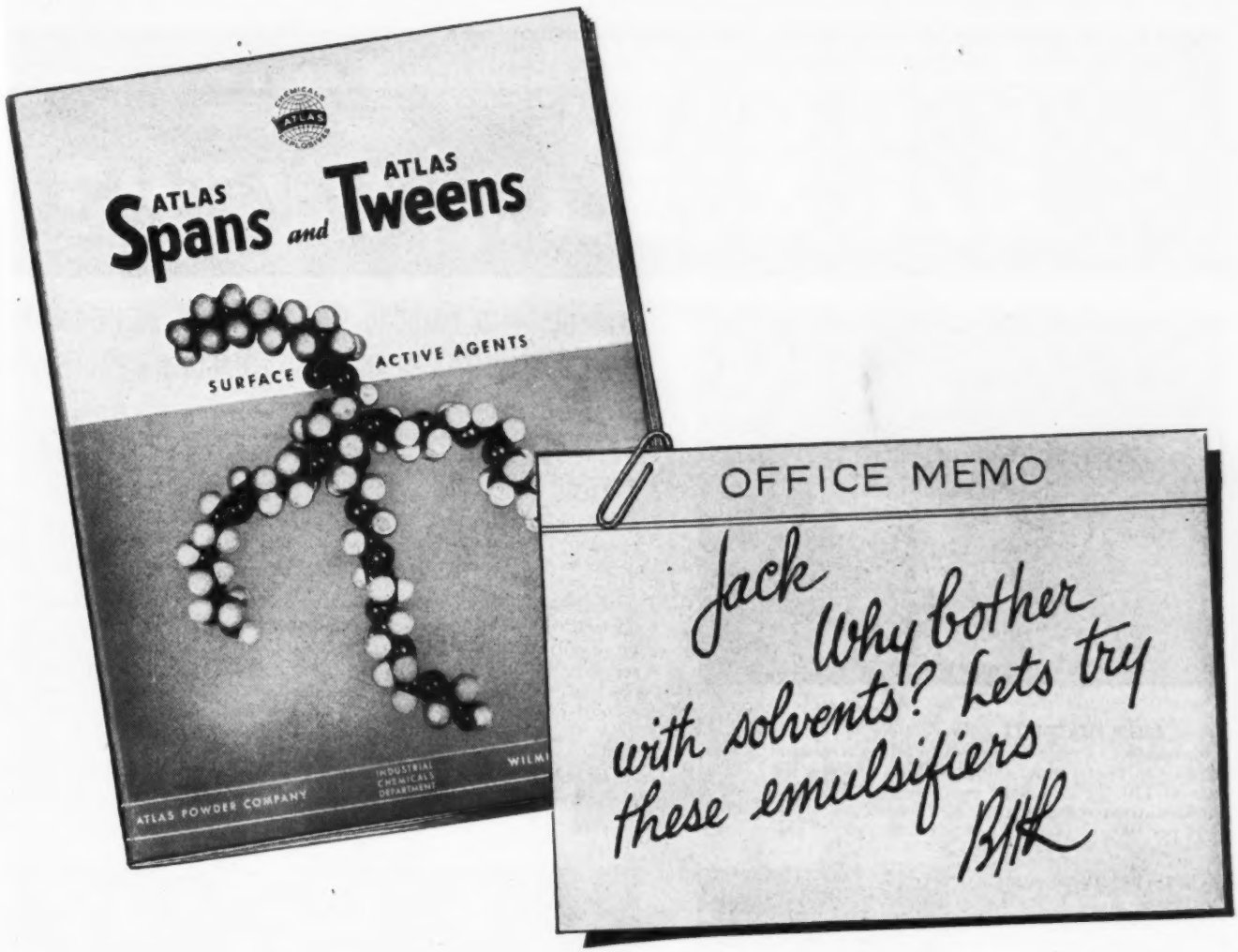

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Atlas Spans constitute a series of technical long chain fatty acid partial esters of hexitol anhydrides. The hexitol anhydrides include sorbitans and sorbides, mannitans and mannides.

Atlas Tweens comprise a series of polyoxyalkylene derivatives of hexitol anhydride partial long chain fatty acid esters.

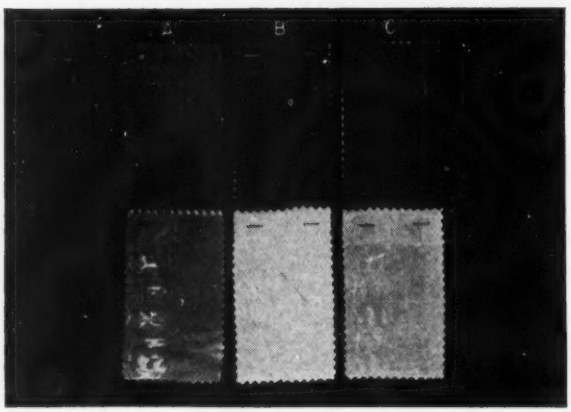
Spans and Tweens: Reg. U. S. Pat. Off.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

LIFE...ON THE



(*Above*) **COLOR FIXATION** of a direct color is illustrated here with samples of yellow spun rayon fabric treated after dyeing at a ratio of 1 lb. of cloth to 30 lbs. of water for 10 minutes at 110° F. in a bath containing AEROSOL C-61. A shows untreated fabric, B treated with 2 lbs. of AEROSOL C-61 per 100 gal. of bath, and C, 0.8 lb. per 100 gal. of bath.

AEROSOL* C-61 CATIONIC SURFACE ACTIVE AGENT OFFERS MANY POSSIBILITIES AS AN AID TO ESTABLISHED PROCESSES

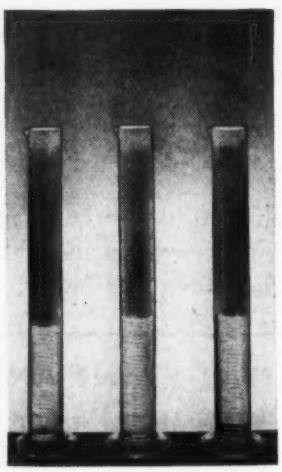
AEROSOL C-61, a newly developed cationic surface active agent, is an ethanolated alkyl guanidine-amine complex of high molecular weight. It is a new product, but already has shown great promise along a wide variety of lines.

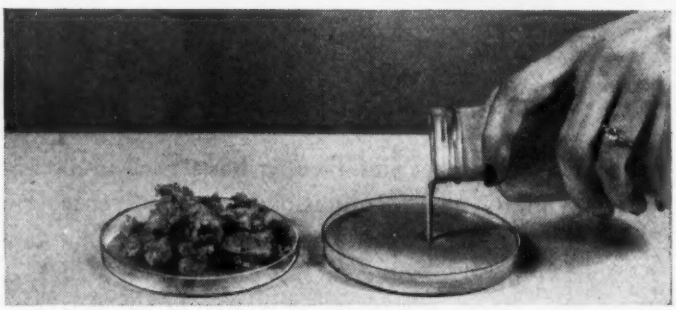
Effective in acid, neutral, or alkaline solutions, AEROSOL C-61 possesses, among other characteristics, good detergent, pigment dispersing, softening, dye mordanting, and dye fixing properties.

AEROSOL C-61 is stable in solution at all working temperatures up to the boil. Although slowly dispersible in water at 86° F., it may be dissolved to best advantage by mixing 1 part with 3 parts of water at 140° F. and pouring the resulting solution into the operating bath held at the desired temperature. If the bath temperature is 120° F. or more, it may be added directly to the bath without prior dilution. It is not decomposed by acids or alkalies.

Characteristics, physical properties, and uses of AEROSOL C-61 are given here. Additional information will gladly be supplied by Cyanamid.

(*Right*) **SOLUBILITY AND FOAMING POWER** of AEROSOL C-61 is shown here with 0.1% of this agent in 5, 10, and 20% H_2SO_4. It is also soluble in concentrated sulfuric acid and chemically stable at temperatures up to 100° C. AEROSOL C-61 is not salted out from solutions containing high concentrations of acetic, sulfuric, hydrochloric, and other acids. The surface tension of 0.1% AEROSOL C-61 in hydrochloric acid at 30° C. is 32.0 in 5% Conc., 31.5 in 10, and 31.1 in 20%; in sulfuric acid, 31.7 in 5, 32.0 in 10, 33.4 in 20, and 40.2 in 80 and 98%.





(*Above*) **PIGMENT DISPERSING POWER** of AEROSOL C-61 is demonstrated by its effect on a 30% press cake of Benzidine yellow pigment. The press cake, consisting originally of solid lumps, is being poured from a bottle after the addition of 10% AEROSOL C-61 on the weight of the pigment. Such dispersing properties may be utilized in the preparation of highly concentrated pigmented pastes.

AEROSOL C-61

CATIONIC SURFACE ACTIVE AGENT

USES

- Pigment dispersing
- Aiding coagulation and speeding settling of certain dry colors during manufacture
- Mordant for certain types of dyes, particularly wool colors
- Voltage builder in electroplating baths
- Reducing bleeding of fugitive colors
- Controlling crystal growth
- Aiding sedimentation processes
- Increasing absorbency of paper towels
- Cationic detergent
- Inhibiting gas fading tendencies of acetate colors
- Fixing agent for certain dyes and colors
- Wetting agent in acid fluxes
- Frothing agent in acid solutions
- Altering adhesive characteristics of resins to glass
- Aid in parchmentizing paper

PHYSICAL PROPERTIES

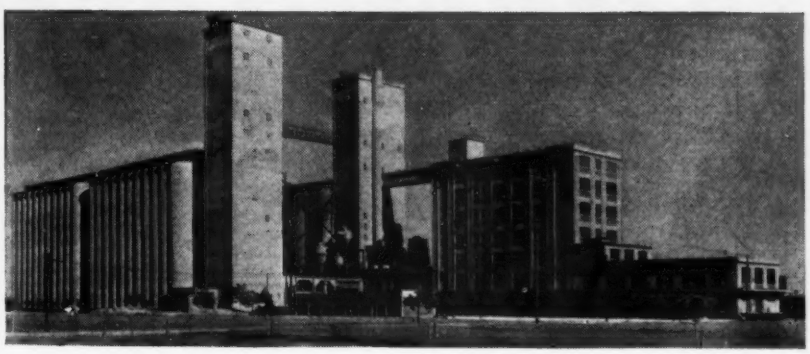
Appearance	brown fluid to brown paste
Solidifying point	varies 15° to 30°C.
Solids	approximately 80%
Solubility in water	2 to 3% disperses in water at 30°C. Yields turbid dispersions up to 10%. Gels above 10%
Solubility in dilute acids	infinite
Stability to storage	excellent
Weight per gallon	approx. 8.5 lbs.
pH	9.0 to 11.0 for 1% solution
Calcium tolerance	excellent
Salt tolerance	2—3% NaCl
Acid and alkali stability	excellent
Odor	ammoniacal
Du Nouy surface tension (25°C.) at 0.1%	32.8 (after 2 minutes aging time)

CHEMICAL NEWSFRONT

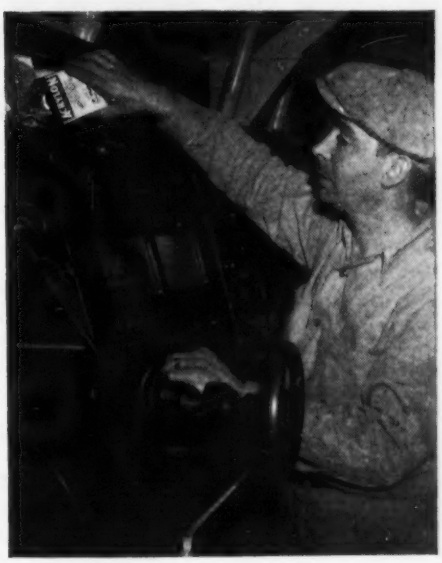
(*Left*) **CYANAMID'S BEETLE* PLASTIC,** so often chosen by manufacturers for its color and beauty, has now been adopted for a new product that specializes in beauty. This device, the Beautiator, is an electrical manicurist, made by the Abar Manufacturing Company of Cleveland, Ohio, and powered by a 1/200-hp, air-cooled motor. The construction and operation of the Beautiator are interesting since they are somewhat revolutionary.

A study was made of the biological growth and health of fingernails, and upon the basis of these facts, it was decided that the perfect manicure or pedicure should include the following operations: disc filing, cuticle rolling, cuticle whisking, nail buffing, and oil massaging. Various attachments perform these operations.

Factory tests indicate that the new manicuring machine will give trouble-free performance under normal conditions for at least 20 years. An essential feature of the Beautiator's attractive appearance and assured long life, is the smart, sanitary, colorful housing of BEETLE plastic, molded by the International Plastics Company.



(*Above*) **TODAY'S "MILL STREAM",** the course pursued by flour during its processing within the mill, is always subject to insect infestation. Periodic fumigation with Cyanamid's Liquid HCN rids mills of insect pests just as Cyanamid's CYANOGAS* Fumigant applied to grain eliminates infestations in grain elevators. Where general mill fumigations are not possible, or to maintain a low level of infestation between fumigations, another Cyanamid product, ACRYLON**, is an effective local or "spot" fumigant. The high toxicity of ACRYLON assures a thorough kill of all mill insects and their larvae. Dosages for different machines and units are provided.



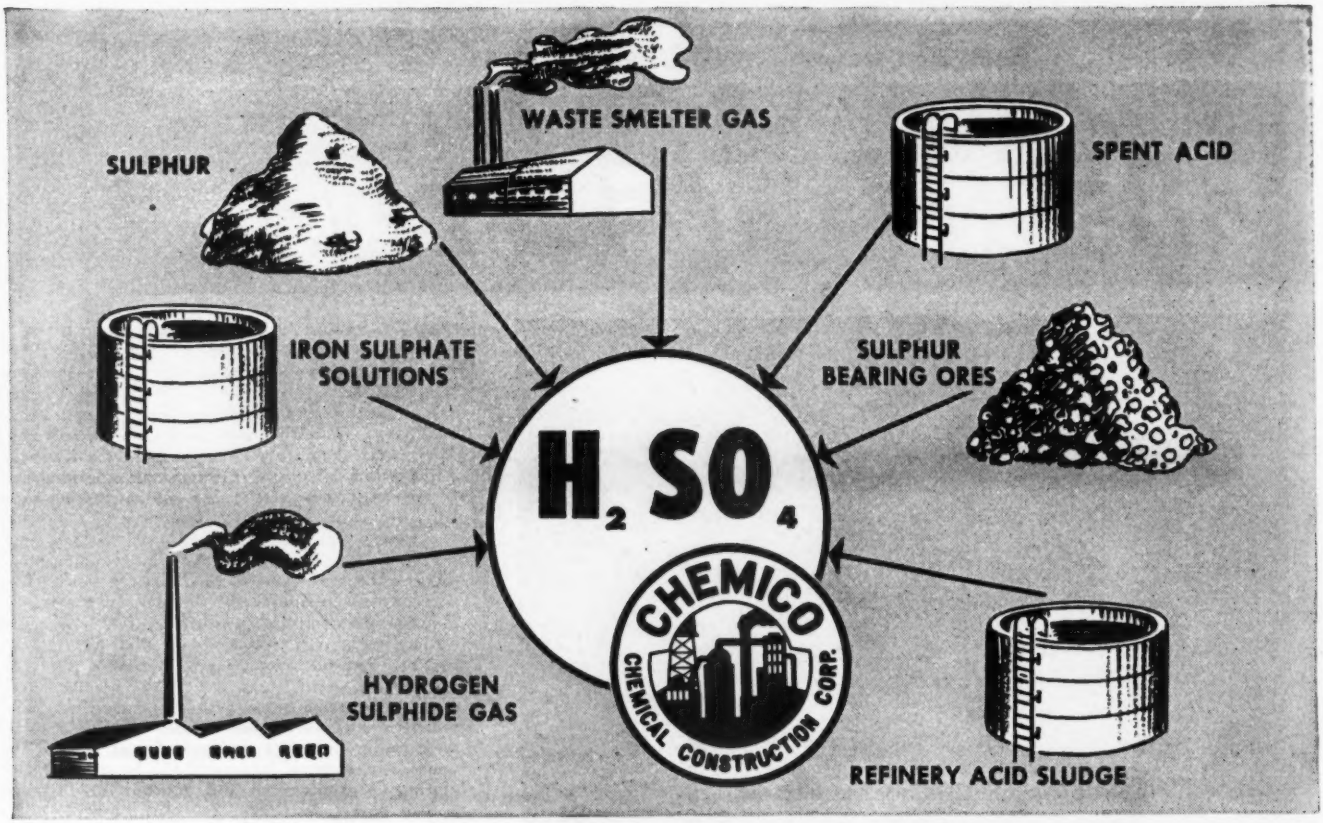
(*Above*) ACRYLON, made up of equal parts of acrylonitrile and carbon tetrachloride, can be poured directly into boot, sifter, or conveyor, which act as fumigation chambers. It vaporizes and effects 100% kill in from 16 to 24 hours without harmful effect on the flour. ACRYLON leaves no odor, color, residue, or caked material in the machines.

*Reg. U. S. Pat. Off. **Trade-Mark

American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.



CHEMICO PROCESSES

use any of these sources for producing

STRONG, CLEAN SULPHURIC ACID

Practically any source of sulphur or sulphur compound available to a refinery or chemical process plant is "grist to the mill" for a CHEMICO sulphuric acid plant.

CHEMICO engineers select the process to suit available raw materials and local requirements, erect and initially operate the plant and train the operating crew.

With a single contract and a single responsibility, you receive a complete sulphuric acid plant, specially designed for your particular conditions and needs, and with an overall performance guarantee.

The CHEMICO organization has specialized in this field for over 30 years, and more than 600 installations all over the world have conclusively demonstrated that "CHEMICO Plants are Profitable Investments." Your inquiry is invited without obligating you in any way.

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CC-110

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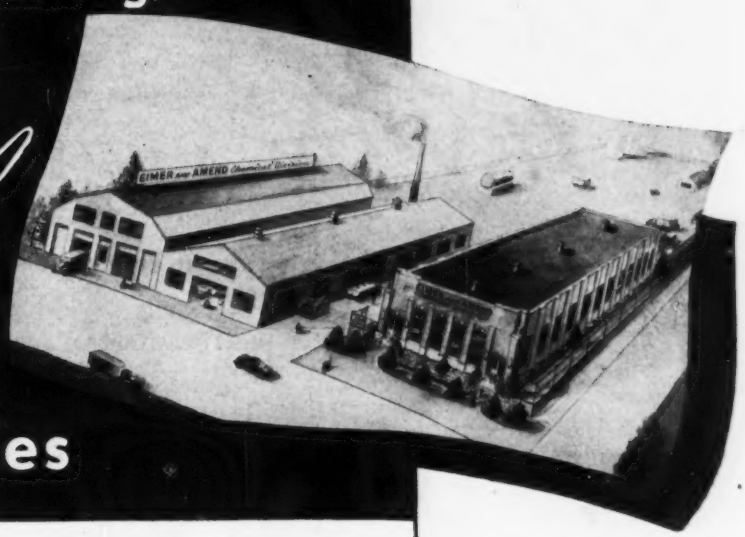
fine Chemicals in Large Quantities



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- Organics
- Solutions
- Special · · formulas

The modern facilities for furnishing fine chemicals in large quantities, maintained by Eimer and Amend at its manufacturing plant in Edgewater, N. J., are at the command of America's chemical industry either as a source for raw materials, packaged compounds or private formulas.

Inquiries should be directed to the company's New York plant where a well-qualified technical staff will cooperate.

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Manufacturing Chemists

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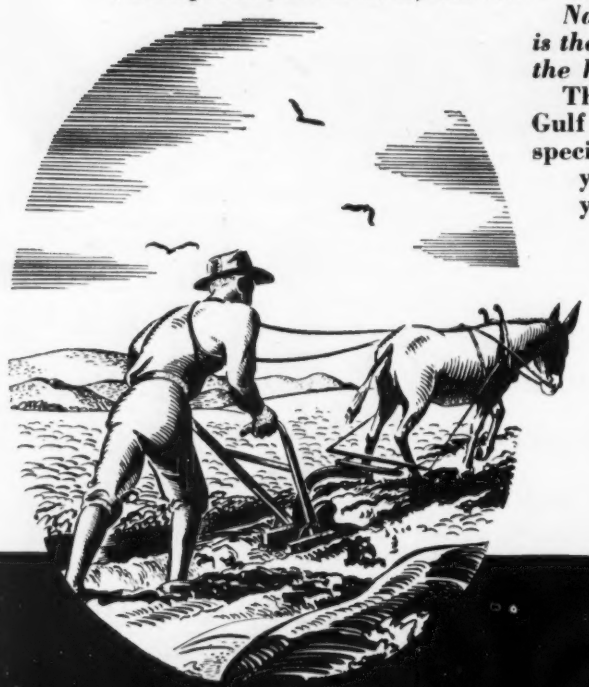
"An Honorable Road to Fortune Lies Open"

These prophetic words about Texas were written 65 years ago by Governor Oran M. Roberts. He addressed them to the agricultural immigrant of that time; they can be repeated, with equal truth and added emphasis, for the benefit of today's expanding industry.

YOUR COMPANY, whatever it manufactures, whatever raw resources it requires, whatever the market in which it sells, will profit by building its new plant on the Texas Gulf Coast. For chemicals, for heavy and light metals, for food processors, for manufacturers of heavy equipment, for gadget makers, the Texas Coast Country offers unrivaled advantages of raw materials, transportation facilities, climate — *and fuel.*



Natural gas — abundant, efficient, economical, smokeless — is the fuel for Coast Country industry. Additionally, it supplies the hydrocarbons for a rapidly expanding chemical industry.

The honorable road to fortune lies open to you on the Texas Gulf Coast. Investigate. Send for a carefully engineered, specially prepared survey of what a Texas location can do for your company. There is neither cost nor obligation, and your inquiry will be kept in strictest confidence. Address Research Department, Houston Pipe Line Company, P. O. Box 2412, Houston 1, Texas.

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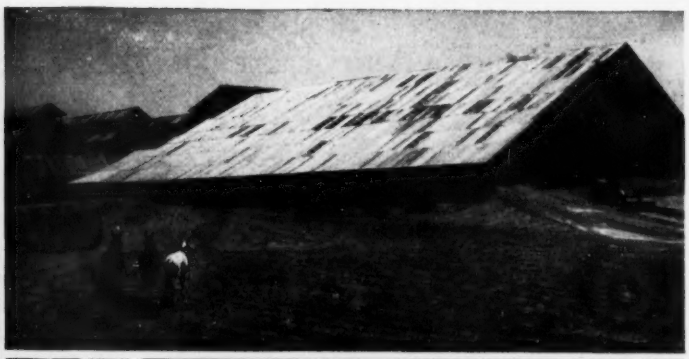
Subsidiary of Houston Oil Company of Texas
Wholesalers of
Natural GAS



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TAR BASES are extracted from coke oven ammonia liquor and coal tar oils.

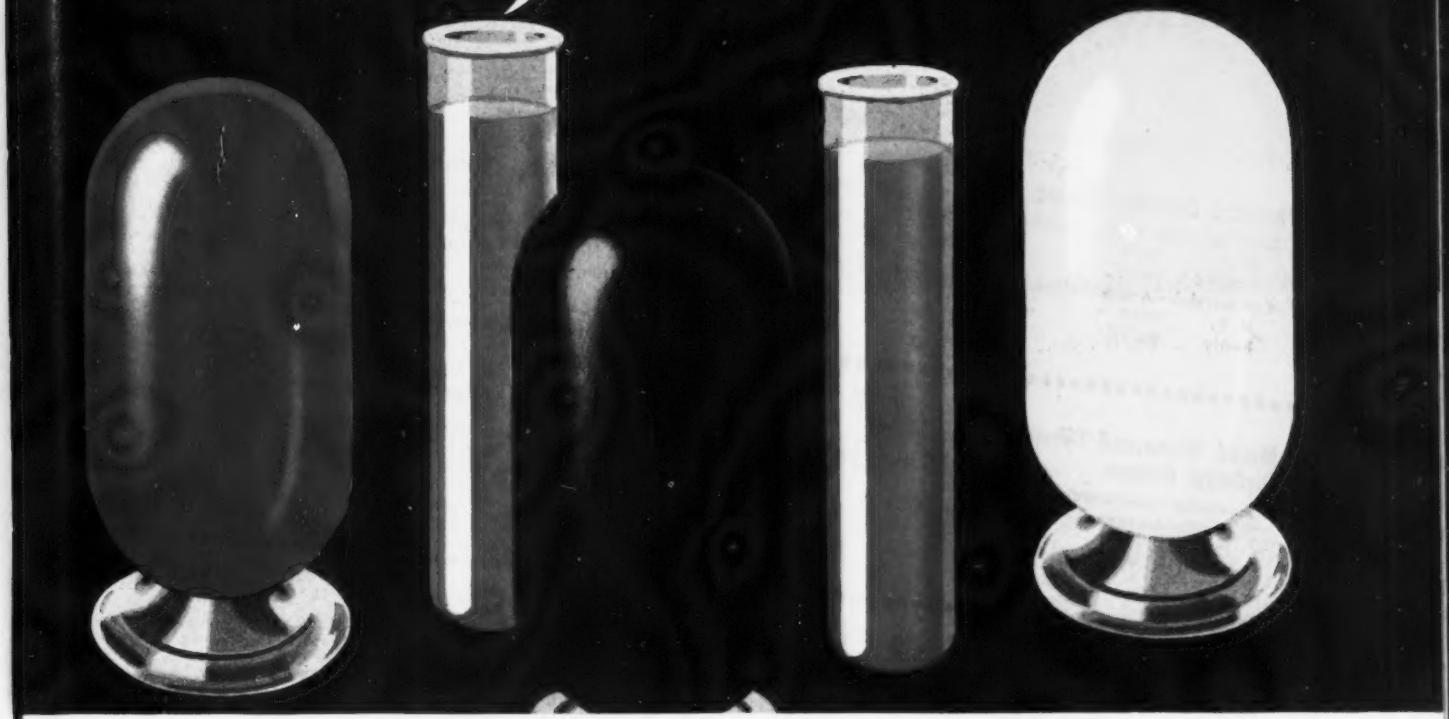
KOPPERS TAR BASES INCLUDE:

Pyridines (including denaturing pyridine meeting the commonly-accepted denaturing specifications); **Alpha Picoline; 3° Mixed Picolines** (Beta Picoline, Gamma Picoline, and 2,6 Lutidine); **2,4 Lutidine; Quinoline; Wider-boiling fractions of Tar Bases** both above and below Quinoline; **Isoquinoline**

These are solvents and chemical raw materials for the manufacture of vitamins, medicinals, and water-proofing agents for textiles. Certain higher boiling tar bases are used in formulating steel mill pickling inhibitors. Write for our Tar Base Data Sheet, giving properties and specifications.

KOPPERS COMPANY, INC.
TAR & CHEMICAL DIVISION, PITTSBURGH 19, PA.

In Printing Color is Life



Measured chemical purity keeps it alive!

7

Baker Chemicals
FOR THE COLOR AND PRINTING INK INDUSTRIES

Sodium Tungstate
Sodium Molybdate
Lead Nitrate
Lead Acetate
Magnesium Carbonate
Acid Nitric
Stannous Chloride

Color commands attention.

It makes you look at a billboard along the highway, an advertisement in a magazine, a package on a dealer's shelf . . .

Artists use brilliant hues, and printers reproduce them, to increase your enjoyment of a beautiful picture, to promote your desire for innumerable things, to stimulate your taste glands.

These arresting hues would be far less persuasive without chemical exactness. Chemical exactness, as found in Baker's Sodium Tungstate, Sodium Molybdate, Lead Acetate or Lead Nitrate, is essential to printing inks of brilliant color—gives them a brilliance that remains alive even when attacked by sunlight and moisture.

The printing and lithographic industry is only one of the many industries where a fine or industrial chemical, manufactured by Baker to exacting standards, makes possible the betterment and processing of numerous products or services.

Baker chemicals, purity by the ton, have been made for a large number of the nation's leading concerns for the manufacture and processing of numerous products.

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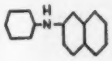
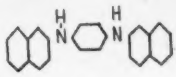
has available for sale these organic chemicals

Phenyl B Naphthyl Amine



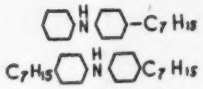
Distilled—Available in commercial quantities
M. P. 107°
Purity 99.5%
Commercial—Available in commercial quantities
M. P. 106°
Purity 98.0%

Di B Naphthyl p Phenylene Diamine



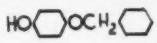
Available in commercial quantities
M. P. 230° C
Purity 98%

Mixed Mono-and Diheptyl Diphenyl Amines



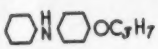
Available in commercial quantities
Distillation range—145-245 (3.0 mm)
Purity 98%

Monobenzyl Ether of Hydroquinone



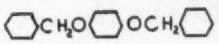
Available in commercial quantities
M. P. 113°
Purity 90%

Isopropoxy Diphenyl Amine



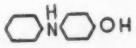
Available in commercial quantities
M. P. 78°
Purity 92% min.

Dibenzyl Ether of Hydroquinone



Available in Pilot Plant quantities
M. P. 119°
Purity 85%

p Hydroxy Diphenyl Amine



Available in commercial quantities
M. P. 15°
Purity 92%

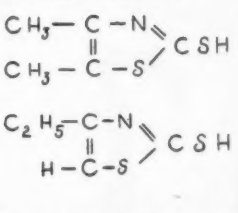
Di Isopropyl Dixanthogen

Available in commercial quantities
M. P. 52°
Purity 98%

N-Nitroso Diphenyl Amine

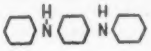
Available in commercial quantities
M. P. 62°
Purity 97%

Mixed Ethyl and Dimethyl Mercaptothiazoles



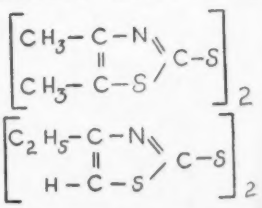
Available in commercial quantities
M. P. 136-153°
Purity Approximately 85% dimethyl and 15% ethyl mercaptothiazoles

Diphenyl p Phenylene Diamine



Available in commercial quantities
M. P. 144°
Purity 92%

Mixed Aliphatic Thiazyl Disulfides



Available in commercial quantities
Liquid

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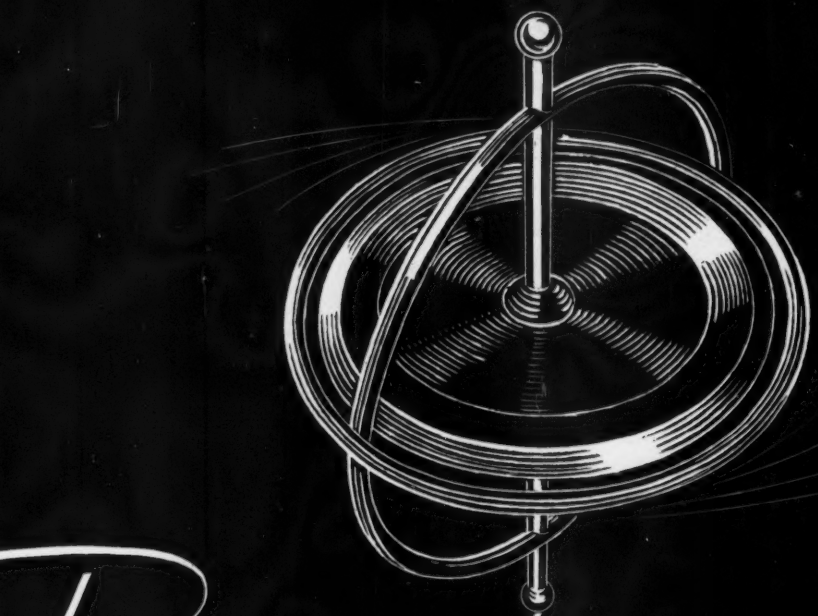

Perfect Balance

NUCHAR activated carbon works best in your purification problems when it is in "perfect balance" with the process. Like any other product with infinite possibilities, you must have the "Know How" to accomplish this perfect balance.

Nuchar technicians will be only too glad to give you the advantage of their wide experiences once your specific problems are disclosed. The manufacturers of NUCHAR have spent many years in the study of activated carbon in purification processes — a study which boils down to the "optimum conditions for purification."

Studies are frequently made for the purpose of furnishing prospective users of NUCHAR that quality which will best serve their individual needs on the basis of efficiency and economy.

No matter what product you want treated with NUCHAR — acids or alkali, tallow or perfume — the "optimum conditions for purification" works for your best interests whether it's for purity of product according to high quality trade standards or for meeting requirements of Pure Food Laws.

NUCHAR is made in a wide range of standard qualities to take care of a multitude of conditions. Special qualities are also available for specific problems. Get in touch with NUCHAR today for complete information and samples to take care of your purification problems.

Industrial Chemical Sales, Division West Virginia Pulp & Paper Company, 230 Park Avenue, New York 17, N. Y.

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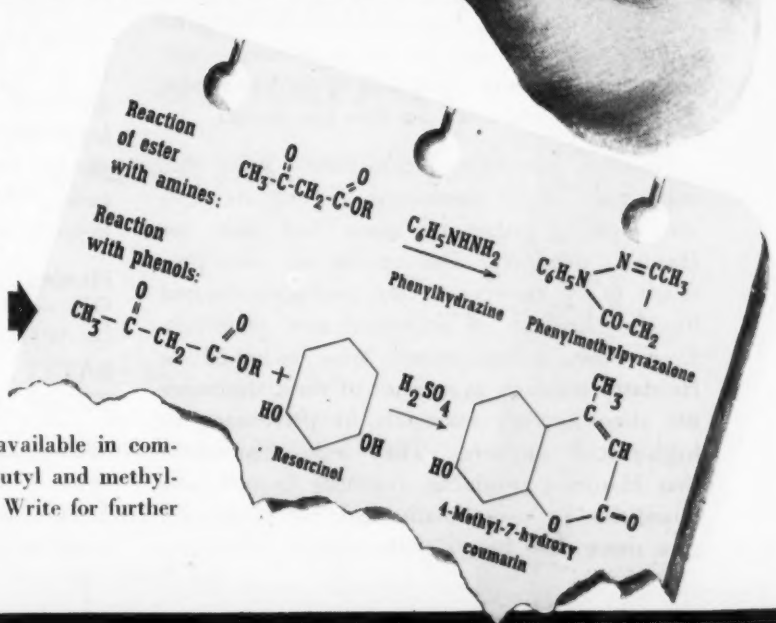
Acetoacetic Esters for

- Dyes & Pigments
- Pharmaceuticals
- Stabilizers
- Sun-Screens

$$CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-O-R$$

The highly reactive acetoacetic esters, long a favorite of organic chemistry professors, have assumed a new importance in modern industry. Two reactions which indicate the many possibilities of these compounds in organic synthesis are shown here.



Both methyl and ethyl acetoacetate are available in commercial quantities. Other esters, such as butyl and methyl-amyl can be supplied in research amounts. Write for further information.

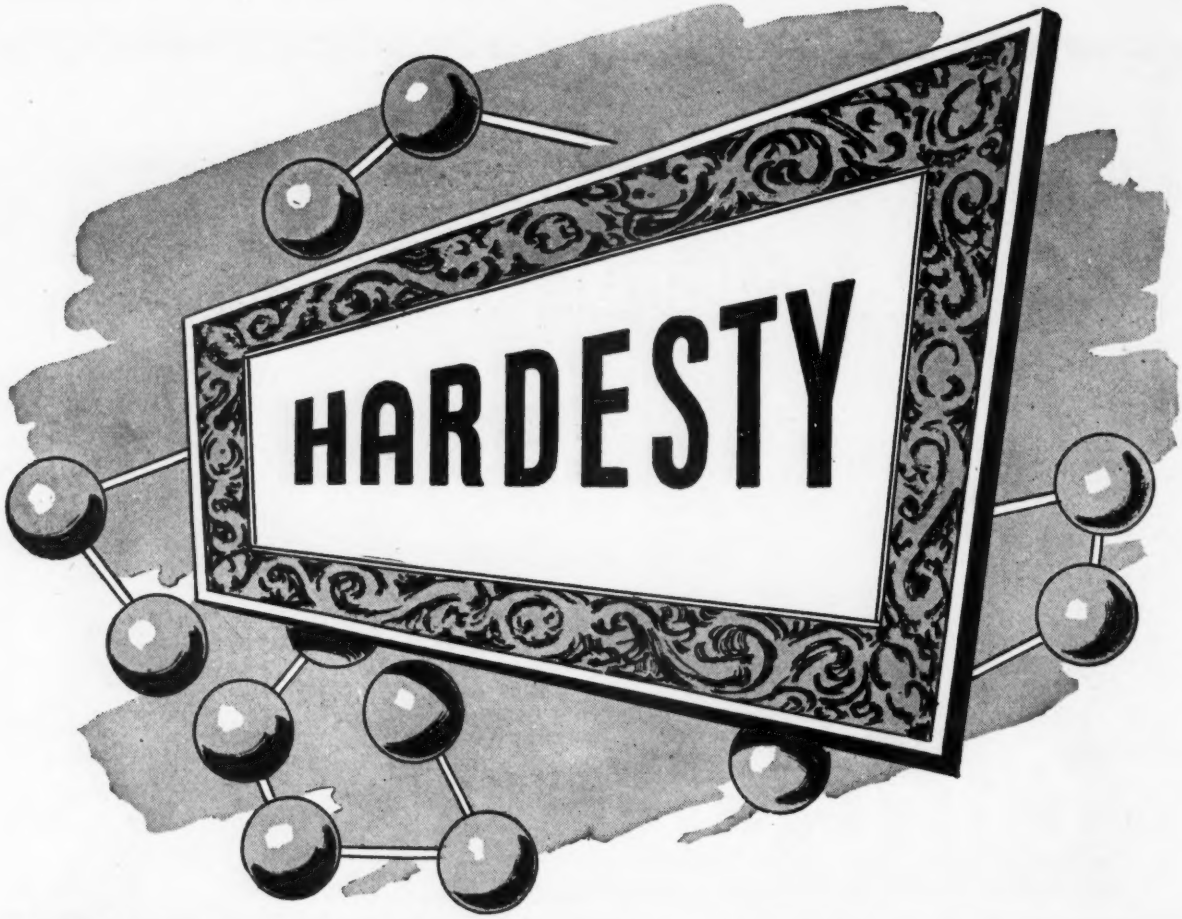
SYNTHETIC ORGANIC CHEMICALS

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York 17, N. Y.



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Many products and processes — some in the minds of planning boards, some in the pilot plant stage, some still in the laboratory — call for the use of Fatty Acids and their derivatives. That's where Hardesty fits into the picture.

Hardesty laboratory technicians — with long experience in the chemistry of Fatty Acids — are working constantly upon new uses for Hardesty products. During the war they provided many answers to the problems created by the shortage of imported raw materials. Even now, manufacturers who switched to Hardesty products as a result of these shortages use these quality materials in preference to high-priced imports. They have discovered that Hardesty products, available in sufficient quantities to meet manufacturing schedules, give more than better performance. Hardesty products are better priced to fit their cost sheets!

The high quality of every Hardesty shipment is a direct outgrowth of this never-ending Hardesty research. Our fund of technical knowledge and experience plus greatly expanded facilities are ready to fit into your picture. That is why we say it will pay you to keep in touch with Hardesty.

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METHYL "CELLOSOLVE" OLEATE

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FATTY ACID ESTERS

STEARATES PALMITATES

OLEATES RICINOLEATES

LAURATES

for the

Textile, Cosmetic, Pharmaceutical
Petroleum, Plastic and Allied
Industries

KESSLER CHEMICAL CO., INC.

ESTABLISHED 1921

STATE ROAD and COTTMAN AVE. • PHILADELPHIA 35, PA.

ALWAYS USE MALLINCKRODT FINE CHEMICALS FOR UNIFORM DEPENDABLE PURITY

Official U. S. Navy Photograph

★ TEXTILE AND PAINT MAKERS DID...

Mallinckrodt Pyridyl Mercury Compounds (a new series of powerful fungicides) protected all manner of military equipment against tropical deterioration.

★ FLUORESCENT LIGHT MAKERS DID...

Fluorescent lamps utilizing phosphors made with Mallinckrodt fine chemicals lighted many vital war tasks.

Official U. S. Marine Corps Photo

★ BATTERY MAKERS DID...

Mallinckrodt Mercuric Oxide was used in the tiny new type batteries of Walkie-Talkies.

★ ★ ★

In peace, as in war, Mallinckrodt is ready to meet the nation's most exacting needs for fine chemicals of uniform dependable purity.

MALLINCKRODT CHEMICAL WORKS

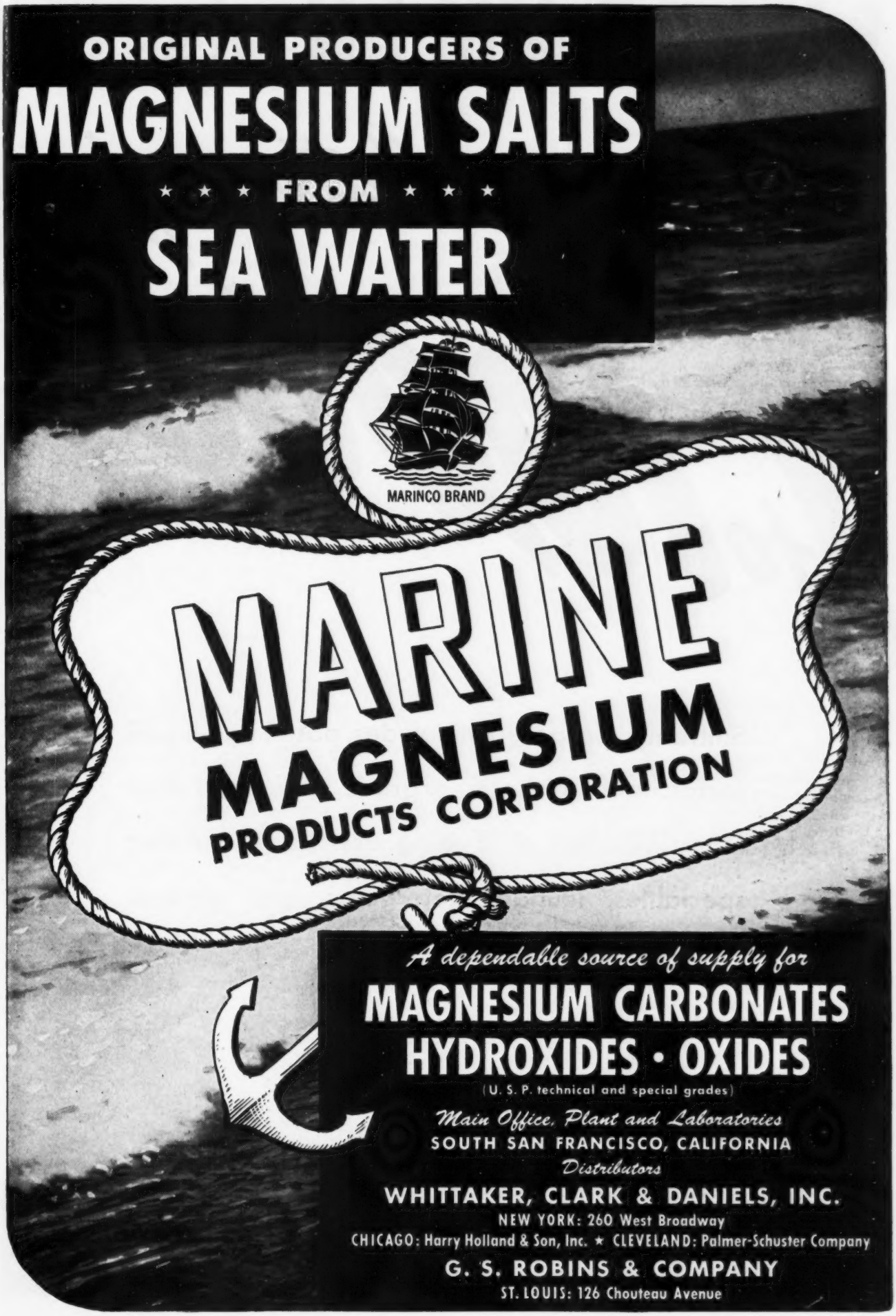
FINE CHEMICALS Mallinckrodt SINCE 1867

79 Years of Service *to Chemical Users*

Mallinckrodt St., St. Louis 7, Mo. • 72 Gold St., New York 8, N. Y.

CHICAGO • PHILADELPHIA • LOS ANGELES • MONTREAL

UNIFORM • DEPENDABLE • PURITY


ORIGINAL PRODUCERS OF
MAGNESIUM SALTS
★ ★ ★ FROM ★ ★ ★
SEA WATER
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PRODUCTS CORPORATION
A dependable source of supply for
MAGNESIUM CARBONATES
HYDROXIDES • OXIDES
(U. S. P. technical and special grades)
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G. S. ROBINS & COMPANY
ST. LOUIS: 126 Chouteau Avenue

SULFRAMIN is an

even in dilutions of

1 to 10,000

Sulframin, prepared in powder, paste, and liquid forms, is a synthetic, organic detergent that manufacturers of dyeing assistants, tanning specialties, laundry detergents, and general cleaners, should know.

ULTRA Chemical WORKS

ULTRA CHEMICAL WORKS, Inc.

effective detergent

Sulframin DT and Sulframin LW (Powder)

Powerful foaming agents and emulsifiers. Unsurpassed wherever hard water presents a problem. LW has a higher Lauric content, and consequently, is preferable when used in water colder than 50° C. Textile processors and manufacturers of dyeing assistants, tanning specialties, bath preparations, laundry detergents, and automotive cleaners, use either type, depending upon the temperature of the solution to be used.

Sulframin DH (Paste)

A concentrated neutral detergent adaptable to the manufacture of various scouring, boiling off and dyeing assistants.

Sulframin DT (Paste)

Is a strictly neutral synthetic detergent which has extremely high wetting qualities. Manufacturers of dyeing assistants and textile processors use it principally in compounding scouring and dyeing preparations to function wherever alkali solutions are to be avoided.

Sulframin DR

Is a neutral detergent having the appearance of a clear, sulfonated oil. It is immediately soluble in either hot or cold water. Sulframin DR is an ideal scouring and wetting out agent; and therefore can be employed advantageously as a straight product or in conjunction with various sulfonated oils. It lends itself ideally to the compounding of shampoos, liquid soaps, and liquid cleansers.

Sulframin P

A powerful built up detergent which is invaluable in the preparation of household detergents and cleaners. It is particularly efficient in washing machines, packaged laundry detergents, and general cleaners.

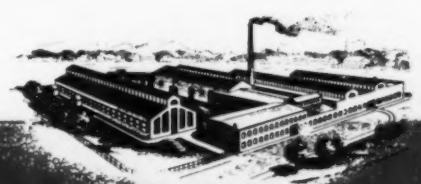
Sulframin DHL

An ideal leveling agent for the solution of your most vexing dyeing problems. It has powerful leveling and penetrating qualities and assures complete satisfaction in the processing of rayon and acetate fabrics. DHL also lends itself ideally to compounding; and is used extensively in the tanning industries for wetting-back applications.

Sulframin N

Although of radically different chemical structure, Sulframin N shares many of the advantages inherent in the other Sulframin products. Its strongest feature is its complete immunity to the effects of inorganic acids and alkalis. Consequently it is preferred in the processing and dyeing of wool. Not only is Sulframin N an outstanding leveling agent; it can also be employed safely with any amount of alkali.

Ultrapone, a liquid emulsifying agent (especially useful in water-in-oil emulsions), is readily dispersible in water, and is soluble in all organic compounds, such as hydrocarbons, alcohols, esters, etc. Formulated to lend greater cleaning power to naphtha solutions, Ultrapone is particularly valuable in dry-cleansing detergents; adhesive emulsions, and in the manufacture of many cosmetics.



PATERSON, NEW JERSEY
CHICAGO, ILLINOIS *IN CANADA: Delta Chemical Works Corp., Brantford, Ontario*

Chemicals

FOR THE PROCESS INDUSTRIES

THERE'S no substitute for the word experience. It's well to bear in mind that Turner has been supplying chemicals to the process industries for over 75 years. Call on us the next time you're in the market and you'll be quick to say that Turner is *"long on quality and strong on service."*

TURNER CHEMICALS

- Ammonium Sulphate (Refined)
- Ammonium Persulphate
- Borax
- Caustic Soda (Flake and Solid)
- Caustic Potash
- Sodium Chloride
- Carbonate of Potash
- Potassium Persulphate
- Copper Carbonate
- Bromides (Sodium — Potassium — Ammonium)
- Phosphorus Oxychloride
- Phosphorus Trichloride
- Stearates (Aluminum—Calcium —Zinc)

JOSEPH TURNER & CO

83 Exchange Place, Providence, R. I. **RIDGEFIELD, NEW JERSEY** 435 N. Michigan Ave., Chicago 11, Ill.

Methallyl chloride and methallyl alcohol are new allyls now available in trial-lot quantities from Shell Chemical Corporation. Chemical properties are similar to allyl chloride and allyl alcohol — made available in commercial quantities last year.

METHALLYL CHLORIDE undergoes the usual replacement reactions of the chlorine atom, and reactions involving the double bond. Ammonolysis produces primary, secondary and tertiary amines; chlorohydrination produces dichloro-tertiary-butyl alcohol. Methallyl chloride hydrates easily in the presence of aqueous solutions of mineral acids to produce chloro-tertiary-butyl alcohol.

In addition, methallyl chloride is an effective fumigant for grains, tobacco and dried fruits.

METHALLYL ALCOHOL readily forms esters. Those of lower organic acids are formed by distillation of the alcohol with the desired acid. Dibasic esters can be conveniently prepared by reacting acid anhydrides with methallyl alcohol in the presence of p-toluene sulfonic acid.

These esters undergo polymerization in the presence of peroxide catalysts . . . the dibasic esters yielding hard, chemically resistant, thermosetting resins. Methallyl alcohol thus offers new possibilities in the growing field of allyl resins.

PHYSICAL PROPERTIES

	METHALLYL CHLORIDE	METHALLYL ALCOHOL
Boiling Point °C.@ 760 mm.	72.2	114.5
Specific Gravity 20/4°C.	0.9257	0.8515
Refractive Index 20/D	1.4276	1.4255
Solubility in Water @ 20°C.	Less than 0.1 grams per 100 grams	Approx. 17 grams per 100 grams
Flash Point °F. (Tag Open Cup)	14	94

SHELL CHEMICAL CORPORATION

100 Bush Street, San Francisco 6 — 500 Fifth Avenue, New York 18

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FEATURED CHEMICALS in the PFIZER FAMILY

- Acetyl Tributyl Citrate
- Acetyl Triethyl Citrate
- Ammonium Oxalate
- Ascorbic Acid
- Bi-Cap Flour Enrichment Mixtures
- Bismuth Preparations
- Calcium Gluconate
- ✔ Citric Acid
- Citrate Esters
- Cream Tartar
- Fumaric Acid
- Gluconic Acid
- Glucono Delta Lactone
- Iron and Ammonium Citrates
- Iron and Ammonium Oxalate
- Iron Gluconate
- Iron Oxalate
- Itaconic Acid
- Niacin
- Niacinamide
- Oxalates
- Penicillin
- Potassium Iodide
- Potassium Oxalate
- Riboflavin
- Rochelle Salt
- Sodium Citrate
- Sodium Gluconate
- Tartaric Acid
- Thiamin
- Triethyl Citrate
- *—and many other chemicals*

no. 1 in a series:

CITRIC ACID

Whether it's to be used as a food, a beverage, a pharmaceutical or an industrial chemical, Pfizer citric acid is a "known quantity." It offers known *quality*, reflecting the many major advances contributed by its makers to its development.

Research at Chas. Pfizer & Co., Inc. has changed the commercial history of this versatile organic acid.

It has widened citric acid's industrial usefulness by reducing the cost of preparation and by developing

domestic sugar as a raw material instead of foreign lemon and lime juice concentrates.

The same thoroughness which made possible these citric acid advances is now applied to the accurate control of the product in manufacture. The technical skill of a well-trained staff is combined with care consistently exercised in every operation. The result is a high degree of uniformity

and purity that can be relied upon safely by citric acid buyers everywhere — and by users of each one of the more than a hundred Pfizer products.

Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 West Grand Ave., Chicago 10, Ill.; 605 Third Street, San Francisco 7, Cal.

PFIZER

Manufacturing Chemists Since 1849

A NEW ERA IN INSECT CONTROL

VELSICOL 1068*

New KILLING POWER

New RANGE OF EFFECTIVENESS

New PHYSICAL CHARACTERISTICS

A reprint of the article on VELSICOL 1068 by Dr. C. W. Kearns, Dr. L. Ingle and Dr. R. L. Metcalf which appeared in the December 1945 issue of the Journal of Economic Entomology is now available for distribution.

Samples of VELSICOL 1068 (20% CONCENTRATION) for test purposes in the production of fly and roach sprays and residual-type sprays are obtainable on request as are samples of technical grade VELSICOL 1068 for experimental purposes in the agricultural field.

OTHER VELSICOL INSECTICIDE PRODUCTS

THE METHYLATED NAPHTHALENES**

VELSICOL AR-50 · VELSICOL AR-60 · VELSICOL AR-70 · VELSICOL NR-70

Correspondence is invited in regard to uses and formulations of the above materials.

* U. S. PATENTS PENDING ** U. S. PATENT NO. 2,347,265 U. S. A. A. F. PHOTO—ACME

VELSICOL Corporation

Manufacturers of Insect Toxicants • Aromatic Solvents • Synthentic Resins • Coresin Core Oils

General Offices: 120 East Pearson Street • Chicago 11, Illinois

New York: 11 Park Place, New York 7, N. Y. Detroit: 408 Boulevard Bldg., Detroit 2, Mich. Cleveland: 1900 Euclid Ave., Cleveland, O.

WE WOULDN'T RECOMMEND STARTING A DIAMOND MINE IN ALABAMA

MUCH as we would like to see you locate here, pleased as Alabamians would be at the employment the opening of a diamond mine in Alabama would give, that is a venture which we wouldn't recommend, even though there is a market in Alabama for diamonds. We wouldn't recommend it because, so far as is presently known, there are no diamond deposits in Alabama.

The case of the diamond mine in Alabama is, of course, an exaggeration but illustrates the point that we will not try to "sell" you Alabama as being ideal for any and all industries. It is an ideal location for some, a very satisfactory one for others and perhaps not suitable for a limited few.

Your inquiry will, after consultation, bring to you an impartial report from which you can determine whether or not there is in Alabama a location which meets your requirements.

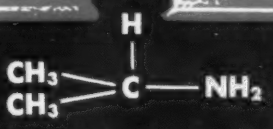
Industrial Development Department

ALABAMA POWER COMPANY

BIRMINGHAM, ALABAMA

NOW COMMERCIALLY AVAILABLE . . .

Sharples
ISOPROPYLAMINE



Isopropylamine is, with the exception of Sharples Monoethylamine, the lowest priced alkylamine on the market and is now available in commercial quantities.

This primary aliphatic amine undergoes the wide variety of reactions typical of its class and therefore offers interesting possibilities as an intermediate for synthesis of many products, including:

Pharmaceuticals	Rubber Chemicals
Insecticides	Textile Assistants
Photographic Chemicals	Dyestuffs

PROPERTIES

Molecular Weight	59.1
Color	Water White
Odor	Amine
Boiling Range —95% between	30.5 - 34.5° C.
Specific Gravity @ 20°/20° C.	0.68 - 0.69
Titre as Isopropylamine	minimum 98.0%
Acid insoluble	maximum 0.2%
Flash Point (open cup)	< 20° F.
Viscosity at 25° C.	0.36 centipoise
Refractive index @ 20° C.	1.376
*Freezing Point	—101.2° C.
pH Value (0.5 N Solution)	12.21
pH Value (0.05 N Solution)	11.64

Soluble in water and most organic solvents.

*Literature value.

Sharples will be glad to send samples together with further information to those who are interested in looking into the possibilities of utilizing Isopropylamine.

SHARPLES TRADE MARK CHEMICALS

SHARPLES CHEMICALS INC. PHILADELPHIA • CHICAGO • NEW YORK

dustries

SHARPLES SYNTHETIC ORGANIC CHEMICALS

PENTASOL* (AMYL ALCOHOLS) BURAMINE* (BUTYL UREA, Tech.)
ORTHOPHEN* (o-AMYLPHENOL)
PENT-ACETATE* (AMYL ACETATE) PENTAPHEN* (p-tert-AMYLPHENOL)
PENTALARM* (AMYL MERCAPTAN) VULTACS* (ALKYL PHENOL SULFIDES)
PENTALENES* (AMYL NAPHTHALENES)

AMYLAMINE ETHYLAMINE BUTYLAMINE
DIAMYLAMINE DIETHYLAMINE DIBUTYLAMINE
TRIAMYLAMINE TRIETHYLAMINE TRIBUTYLAMINE

DIETHYLAMINOETHANOL
ETHYLETHANOLAMINE
ETHYLDIETHANOLAMINE
ETHYLETHANOLAMINES 161
DIBUTYLAMINOETHANOL
BUTYLETHANOLAMINE
BUTYLDIETHANOLAMINE
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DI-tert-AMYLPHENOL
DIAMYLPHENOXYETHANOL
o-sec-AMYLPHENOL
AMYL SULFIDE
TETRAETHYLTHIURAM DISULFIDE
TETRAETHYLTHIURAM MONOSULFIDE
TETRAMETHYLTHIURAM DISULFIDE
ZINC DIETHYLDITHIOCARBAMATE
ZINC DIMETHYLDITHIOCARBAMATE
ZINC DIBUTYLDITHIOCARBAMATE
CUPRIC DIETHYLDITHIOCARBAMATE
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* Trademark Registered

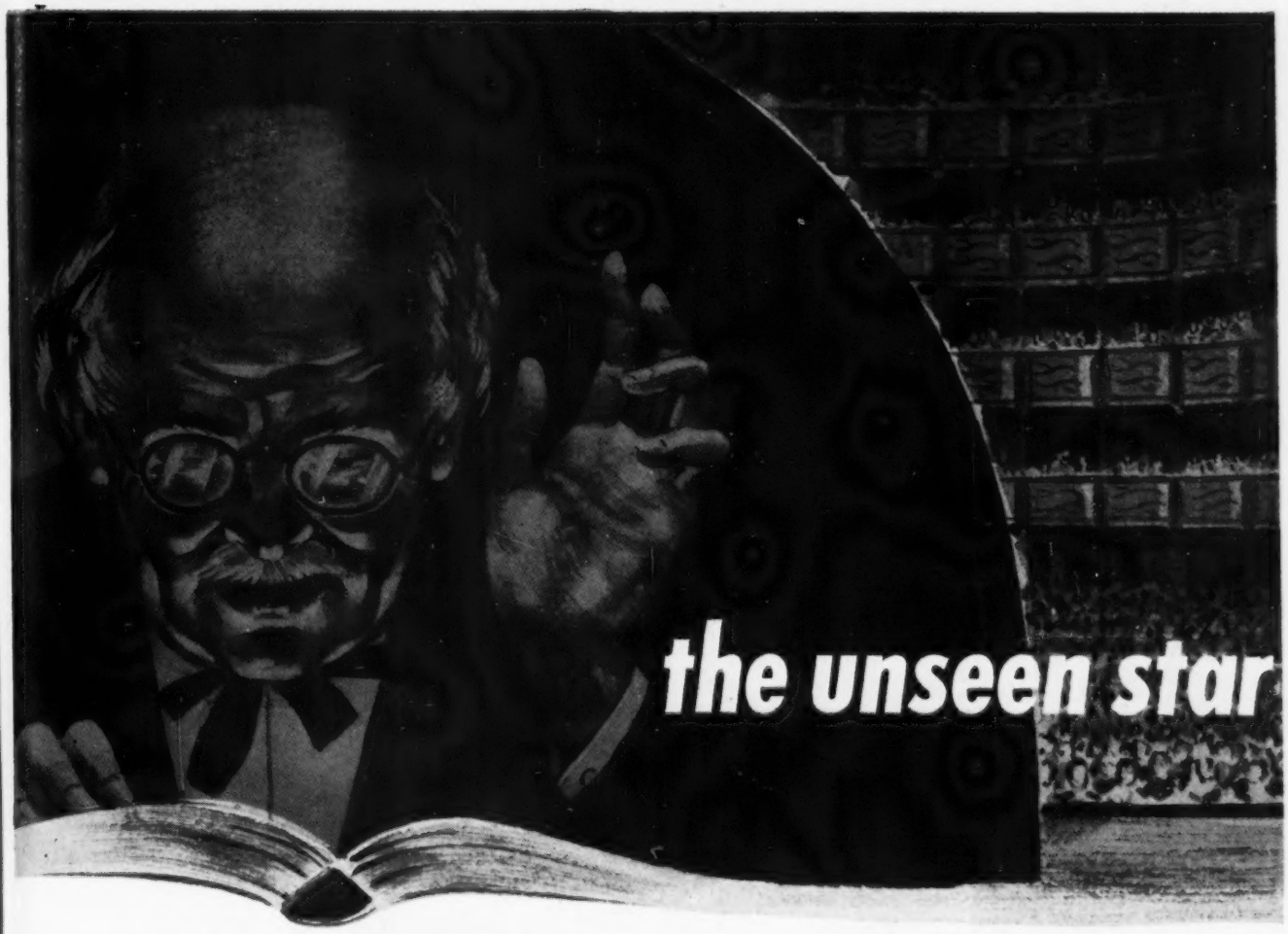
SHARPLES CHEMICALS INC.

EXECUTIVE OFFICES: PHILADELPHIA, PA.
PLANT: WYANDOTTE, MICH.

Sales Offices

NEW YORK CHICAGO

West Coast: MARTIN, HOYT & MILNE, INC., Los Angeles . . San Francisco . . Seattle
Canada: SHAWINIGAN CHEMICALS LTD., Montreal, Quebec
Export: AIRCO EXPORT CORP., New York City



Down in the prompter's box, hidden from the eyes of opera-goers, is the unseen star. He skillfully blends the music and action into a perfect performance. It is with the same master's touch that Kelco Algins blend ingredients—merging them completely—yet remaining entirely in the background.

Kelco Algins are products of Nature, free of impurities and skillfully refined to rigid specifications. They guarantee uniform performance. Kelco Algins are designed for stabilizing, emulsifying, thickening, bodying, film-forming and suspending. New uses are constantly being discovered for Kelco Algins in pharmaceutical, food and other industrial applications.

Kelco Algins are not variable — adjust themselves to changeable conditions. They are adaptable to the precise standards required for your specific applications. Kelco Algins help obtain complete uniformity of results.

May we assist you in your stabilizing problems? Our Technical Department is at your service. Just write us your intended use. There will be no cost or obligation.

KELCO
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ALGIN
PRODUCTS

KELCO COMPANY

75 E. Wacker Drive
CHICAGO-1

31 Nassau Street
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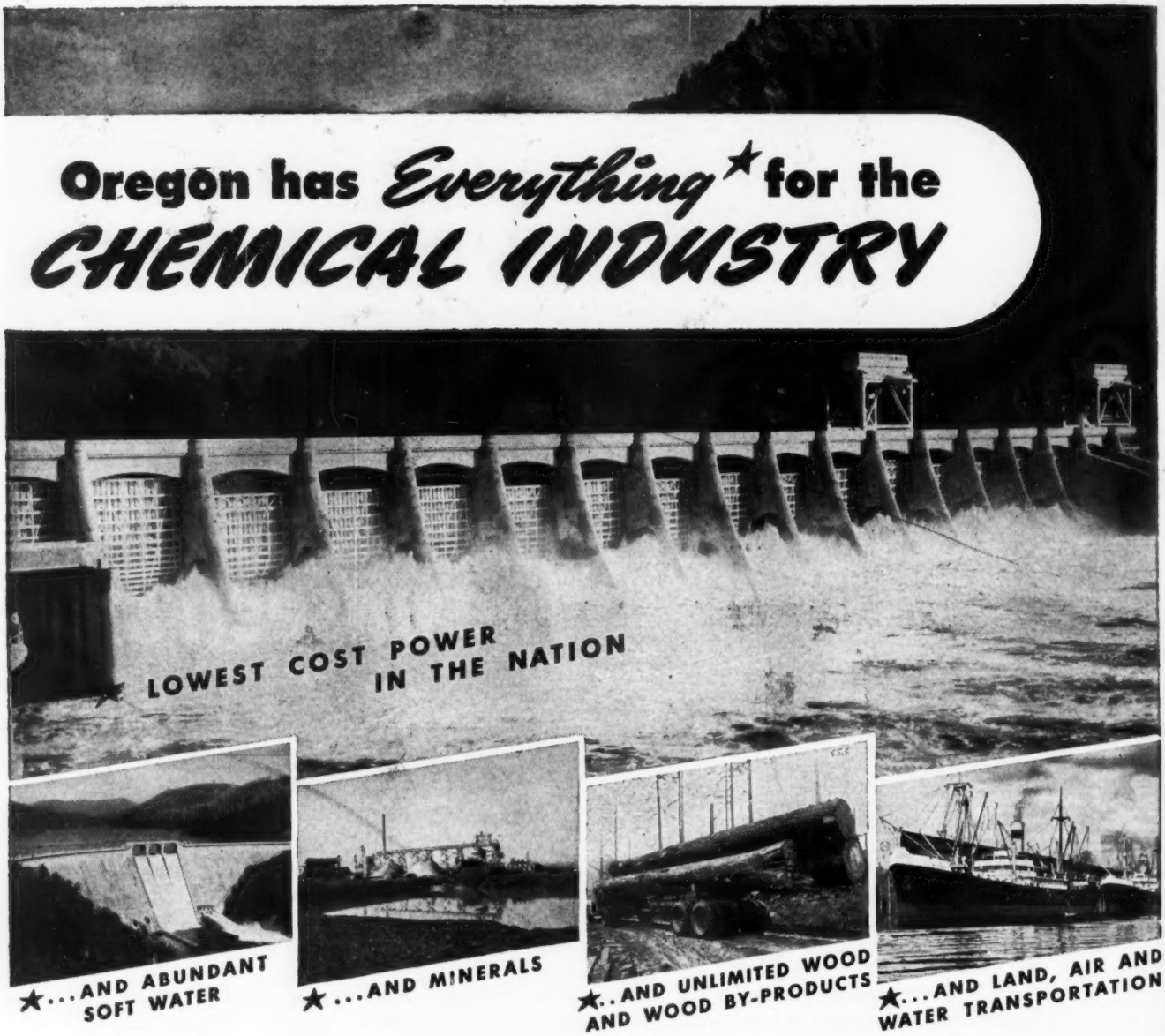
Oregon has *Everything*★ for the CHEMICAL INDUSTRY


★ LOWEST COST POWER IN THE NATION
★...AND ABUNDANT SOFT WATER
★...AND MINERALS
★..AND UNLIMITED WOOD AND WOOD BY-PRODUCTS
★...AND LAND, AIR AND WATER TRANSPORTATION

PACIFIC NORTHWEST has one-fourth of the nation's developed and potential source of water power. Within this region is Oregon, home of hundreds of industries benefitting from the most favorable power rates available anywhere in the United States.

Power has modernized and implemented industrial Oregon. Chemical manufacturers know this. Besides aluminum reduction, the Portland area produces pulp and paper, petroleum derivatives, asphalt, carbide, alum, soap, sodium chlorate, ferroalloys, oxygen, acetylene, and a host of other chemical products.

Manufacturing Opportunities

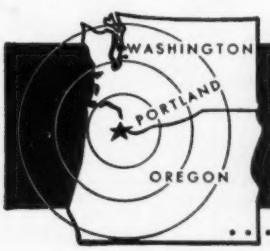
A number of opportunities for chemical manufacturing are offered in the production of caustic soda, chlorine, pharmaceuticals, phosphoric acid, viscose rayon, artificial abrasives, tanning materials and fertilizer. The calcium carbide produced in this region can be converted to acetylene, which is the starting chemical for a number of other important products—acetic acid, vinyl plastics, dichloroethylene, etc.

Strategic Materials

In addition to minerals from Nature's storehouse in the Pacific Northwest, strategic materials can also be imported from Alaska, the Orient, "down under" and elsewhere, for Portland has a fine fresh water port and a wide 35-foot depth channel to the sea. Abundant sources of relatively soft water, excellent rail, air and truck transportation, and equable climate, and stable labor conditions will attract chemical manufacturers to the lower Columbia River area.

Chemical and metallurgical studies are being made by the Portland Chamber of Commerce. Send data on your raw material, power, water and other requirements and get the facts on Oregon's advantages for your industry. Your letter may lead to a lifetime in a land where you will like to live as well as make a living.

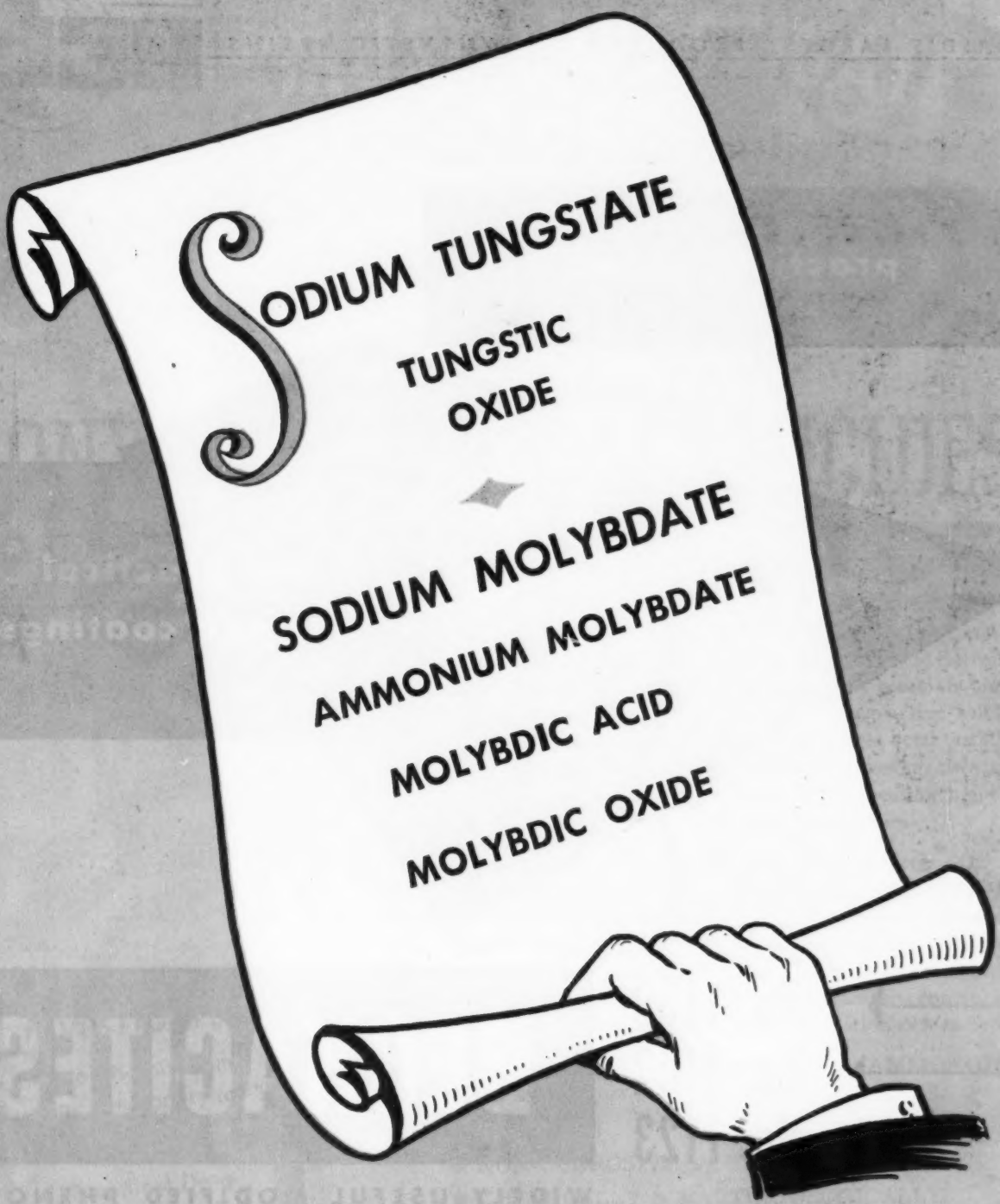
Write to: *Chester K. Sterrett, Manager, Industries Dept., Portland Chamber of Commerce, Portland 4, Oregon, for specific information on these opportunities.*



PORTLAND

Fresh Water Port of the Pacific

INDUSTRIAL CENTER OF THE NORTHWEST



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Chicago Office: 230 N. Michigan Ave.

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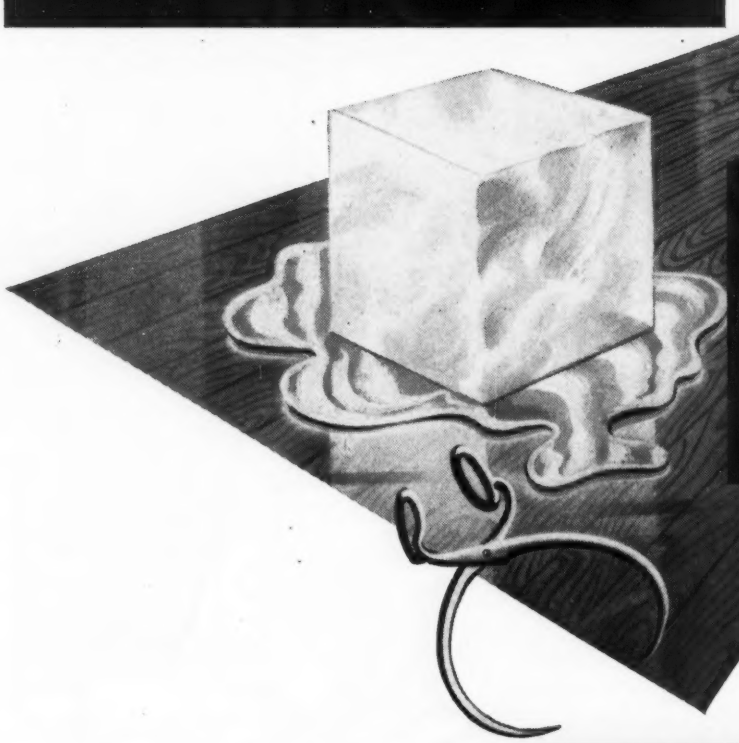
MOLYBDENUM CORPORATION OF AMERICA

WORLD'S LARGEST PRODUCER OF SYNTHETIC RESINS

RCI

practical resins



for practical surface coatings

No. 1100
No. 1102
No. 1123

BECKACITES

WIDELY USEFUL MODIFIED PHENOLICS

In these days of shortages and war-altered products it's good to know that for your basic varnishes and vehicles you can still procure basically sound resins. The three Beckacites listed here, for example, can be relied upon to produce surface coatings worthy to bear your name. No. 1100 Beckacite is a fine all-purpose resin, giving normal cooking procedures, good viscosity, quick drying and good abrasion resistance. No. 1102 Beckacite combines excellent results with genuine economy. No. 1123 Beckacite is for top quality varnishes and enamels—assuring fast bodying in the kettle . . . fast drying, particularly with soft oils . . . and exceptional wearing properties. Put your formulation on a firm basis—write to the Sales Department at RCI for further facts about these widely useful modified phenolic resins.

REICHHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit 20, Michigan

Other Plants:
Brooklyn, New York • Elizabeth, New Jersey • South San Francisco, California • Tuscaloosa, Alabama • Liverpool, England • Paris, France • Sydney, Australia

SYNTHETIC RESINS • CHEMICAL COLORS • INDUSTRIAL PLASTICS • INDUSTRIAL CHEMICALS

Here's a "MUST INVESTIGATE" for Progressive Disinfectant Manufacturers

ONYX "CATIONIC GERMICIDES"

Alkyl Dimethyl Benzyl Ammonium Chloride 50%

THESE outstanding Onyx compounds are a definite contribution to improving Public Health. Onyx Cationic Germicides are backed by 35 years of intensive Onyx research and leadership in the manufacture of cationic surface active salts, produced under rigid laboratory control. They have been tested, proved and extensively used by our Armed Forces in every theater of war. They're the answer to the demand for meeting higher public health standards, not met by other bactericides.

Suitable for dilution by disinfectant manufacturers, Onyx ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE makes an ideal germicide for general disinfection; sanitization of eating utensils and food handling equipment; control of slime and algae; cold disinfection and storage of surgical instruments; inhibition of bacterial growth in rinse waters; sanitary control in dairies and milk barns; and for effective deodorization everywhere.

Onyx ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE is

- ODORLESS
- COLORLESS
- NON-CORROSIVE
- STABLE
- CHEMICALLY & BACTERIOLOGICALLY CONTROLLED

INVESTIGATE!

Write on your company's stationery for

- ✓ Sample
- ✓ Technical Data Sheets
- ✓ Toxicity Studies

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INDUSTRIAL DIVISION

ONYX OIL & CHEMICAL COMPANY

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Producers of

SULPHUR

Large stocks carried at all times, permitting prompt shipments . . . Uniformly high purity of 99½% or better . . . Free of arsenic, selenium and tellurium.

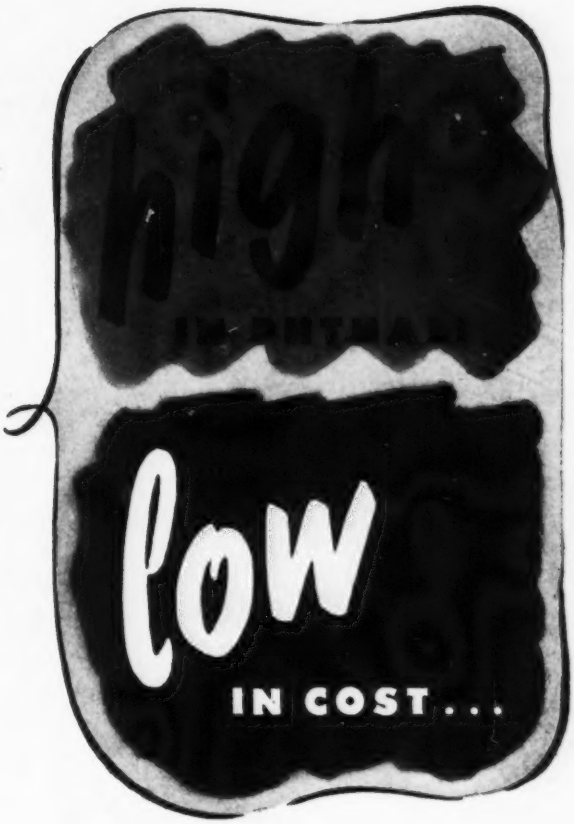
★

TEXAS GULF SULPHUR CO. INC.

75 E. 45th Street New York 17, N.Y.

Mine: Newgulf, Texas

AROPLAZ 1379



...for air-dry and low-temperature baking finishes.

AROPLAZ 1379, a modified alkyd resin of medium-to-short oil length, is U. S. I.'s answer to your current need for a high-quality, low-cost, non-quota resin. Its high phthalic content assures top performance in a wide variety of air-drying and low temperature baking finishes for such items as metal cabinets, toys, hardware, implements, and similar items. It also works well in metal primers, low-cost finish coats, and as a general utility vehicle. This versatile resin is priced at a very attractive level. Your request for samples will receive prompt attention. Phone or write today.

Specifications

Solution:	49-51% solids in mineral spirits
Viscosity (G.H.):	X-Z
Color (G.H. 1933):	10-12
Acid value (solvent free basis):	10-16
Wt/gallon @ 250 C.:	7.7-7.8 lbs.
Oil Content (solvent free basis):	No reportable oil
Phthalic Anhydride (solvent free basis):	33%

U.S.I INDUSTRIAL CHEMICALS, INC.
60 East 42nd Street, New York 17, N. Y.

MEMORANDUM

DATE: June 1, 1946

TO: Industry

FROM: Virginia-Carolina Chemical Corporation

SUBJECT: H_3PO_4

The demand for V-C Phosphoric Acids is becoming greater daily. To meet your increasing needs for these dependable acids of wide utility, our production facilities are being broadened as rapidly as possible.

We invite special consideration of V-C 85% U.S.P. Syrupy, V-C 85% Technical and V-C 75% Food Grades, and assure prompt, personalized attention to your inquiries for these high purity acids.

OK
order now
MC

VC CHEMICALS

VIRGINIA-CAROLINA CHEMICAL CORPORATION

RICHMOND 5 VIRGINIA

HAND IN HAND WITH INDUSTRY

Immediately Available...

B & A Sodium Hydroxide, Chip*

REAGENT, A.C.S. & U.S.P.

FOR MANUFACTURING USES: IN DRUMS

FOR LABORATORIES: SMALLER CONTAINERS

B&A Sodium Hydroxide, Chip—in both the Reagent, A.C.S., and U.S.P. grades—is immediately available for your production or laboratory requirements.

Whether you need tonnage quantities for manufacturing purposes or convenient one or five-pound bottle lots for laboratory use, you will find this purity product of General Chemical Company's Baker & Adamson Division has many advantages to offer. It is easy to handle, economical to use and—as always—is a chemical of highest purity in every grade . . . a product worthy of the B&A "Shield of Quality" it bears.

When ordering, be sure to ask for B&A Sodium Hydroxide, Chip. For the Reagent, A.C.S. grade, specify B&A Code 2249; for the U.S.P. grade, B&A Code 2251.

CONSIDER THESE IMPORTANT ADVANTAGES

1. Chip form, convenient to weigh and handle.
2. Faster rate of solution, because of the thin, flat particle size.
3. Easily ground to powder form.
4. Speeds up fusions.
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***STICKS and PELLETS, too!**

For the user whose needs indicate another form is desirable, B&A offers Sodium Hydroxide in sticks and pellets, too. Full information from the nearest Sales and Technical Service Office.

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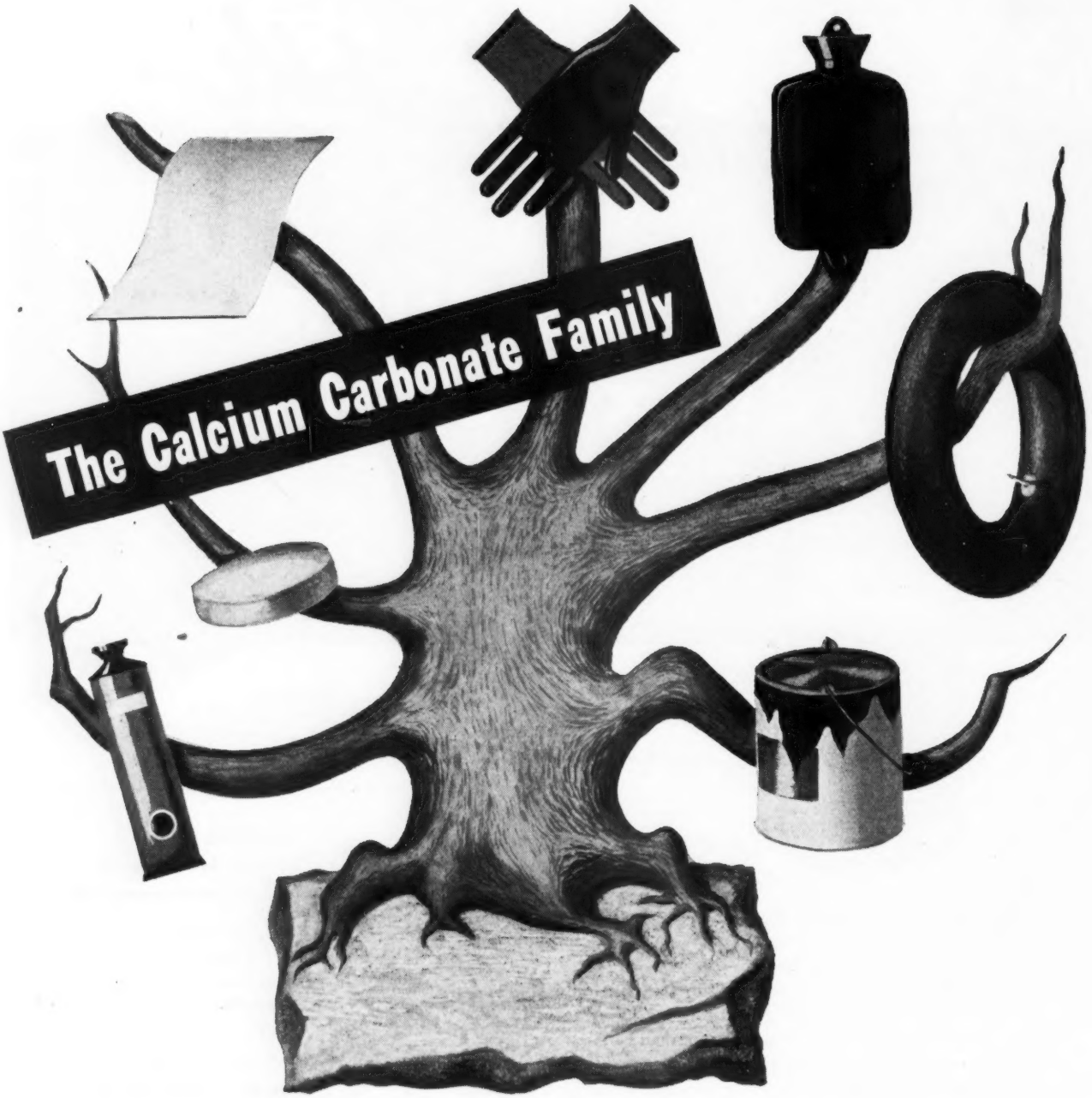
SETTING THE PACE IN CHEMICAL PURITY SINCE 1882



Here are just a few of its members . . . tooth paste, penicillin, paper, paint, rubber gloves, a hot water bottle, an inner tube . . .

Wyandotte Chemicals Corporation has an important part in this family relationship. From such a crude material as limestone, one of Wyandotte's basic raw materials, chemical processes and change produce a truly high-grade chemical — Wyandotte Precipitated Calcium Carbonate. Through an intricate chemical process, particle size, density, uniformity, color and purity of the product are carefully controlled.

Today practically all dental pastes and powders have Calcium Carbonate as their main component — and the use of the Wyandotte product means that teeth can be cleaned with *safety* since all harmful abrasives are eliminated. Wyandotte Precipitated Calcium Carbonate is also now used in the manufacture of the new penicillin tablets.

Wyandotte Precipitated Calcium Carbonate makes possible the printing of coated paper at high speed and contributes to its whiteness and brightness. In the paint and varnish industry, Wyandotte Precipitated Calcium Carbonate is an extender giving the product improved body and opacity. It is the best pigment known for many rubber products—lending tensile strength and tear resistance to rubber gloves, hospital sheeting, hot water bottles, rubber bands. . . .

With so many industries calling for Precipitated Calcium Carbonate, no wonder Wyandotte is kept busy!

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AS everybody knows, the war and the widespread disruptions following it have caused a serious world-wide shortage of fats and oils, from which glycerine is derived.

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Just as bread is short because of the world-wide shortage of wheat so, temporarily, the full demand for glycerine cannot be supplied because of the shortage of fats and oils.

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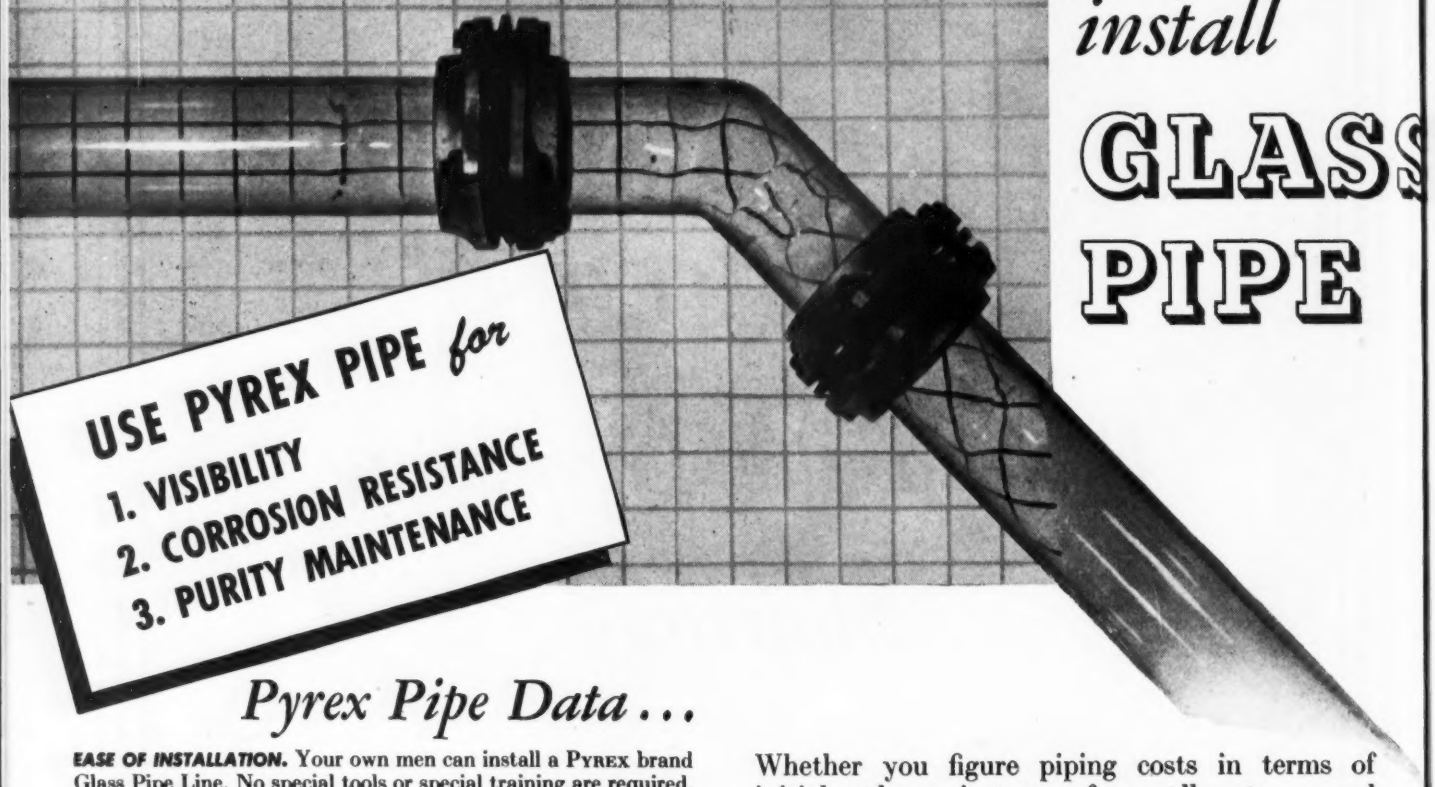

Pyrex Pipe Data . . .

EASE OF INSTALLATION. Your own men can install a PYREX brand Glass Pipe Line. No special tools or special training are required. The pipe, the fittings and the hardware come to your installation point ready for assembly. There's no cutting to lengths, no threading necessary on the job. Stock adaptor flanges are available to connect PYREX Pipe to metal pipe and other plant equipment.

SIZES AND FITTINGS. PYREX brand Glass Pipe is now available in 1″, 1½″, 2″, 3″ and 4″ i.d. A complete line of standard PYREX fittings includes ells, tees, return bends, laterals, and reducers. Special fittings can be readily made to your specifications.

PRESSURES AND TEMPERATURES. Operating temperatures as high as 250°F. are not unusual—and temperatures as high as 400°F. can be considered. Most installations operate at pressures up to 50 p.s.i.—but pressures as high as 100 p.s.i. can be considered.

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MAINTAINING PRODUCT PURITY.—PYREX Pipe is resistant to all acids (except HF) and moderate alkalis. There is no heavy metal pickup or danger of metallic contamination. PYREX Pipe lines assure the ultimate in obtaining product purity.

Whether you figure piping costs in terms of initial outlay or in terms of over all costs—spread over the length of service it will give you—PYREX Pipe is your best bet.

PYREX Pipe (accessories included) costs about the same or less than full weight copper or brass pipe in comparable sizes. It is lower in cost than most other corrosion resistant alloy pipe. But when you take into consideration length of service, elimination of replacements due to corrosion and the savings in shut-down time, PYREX Pipe can be considered a permanent investment.

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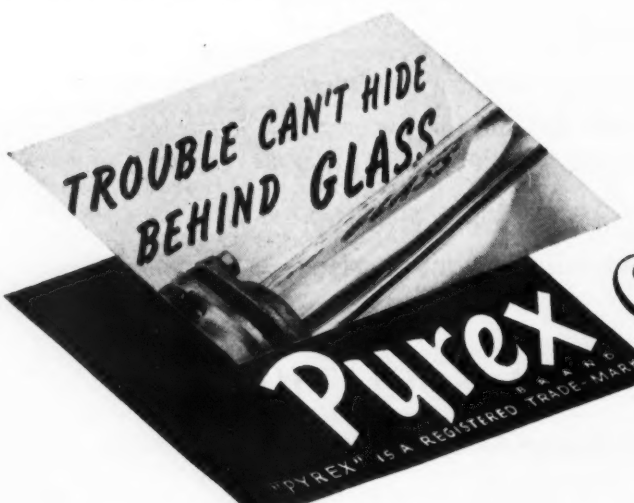
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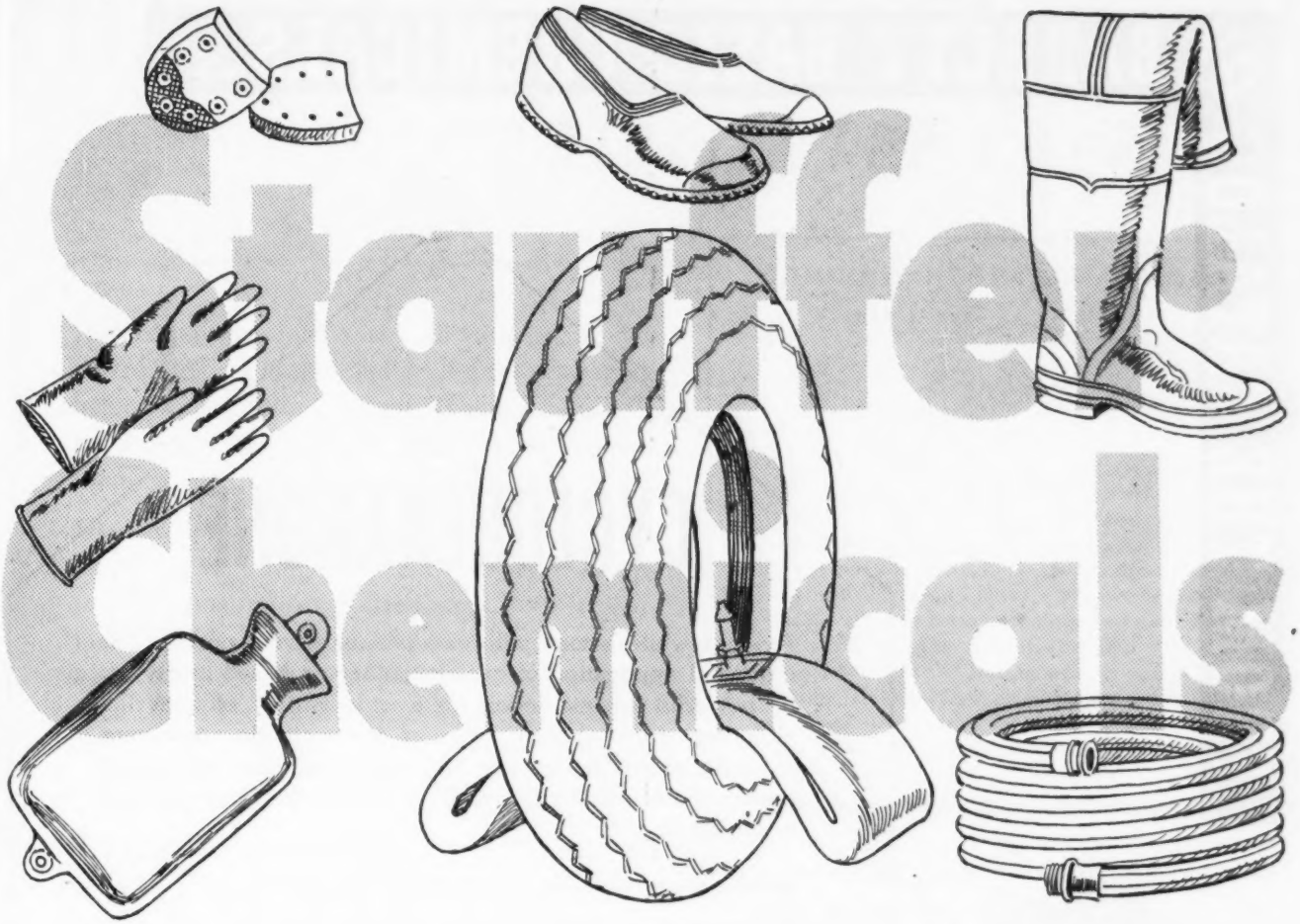

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Since the turn of the century Stauffer has been supplying rubber-makers' sulphurs to the rubber industry. A more recent development is Crystex insoluble sulphur — an amorphous sulphur that prevents bloom in uncured rubber stocks.

If you require large quantities of quality chemicals it will pay you to investigate the products and facilities offered by Stauffer.

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*Aluminum Sulphate
Borax
Boric Acid
Carbon Bisulphide
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Chlorine
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Muriatic Acid
Nitric Acid
Silicon Tetrachloride
Sodium Hydrosulphide
Stripper, Textile
Sulphur
Sulphuric Acid
Sulphur Chloride
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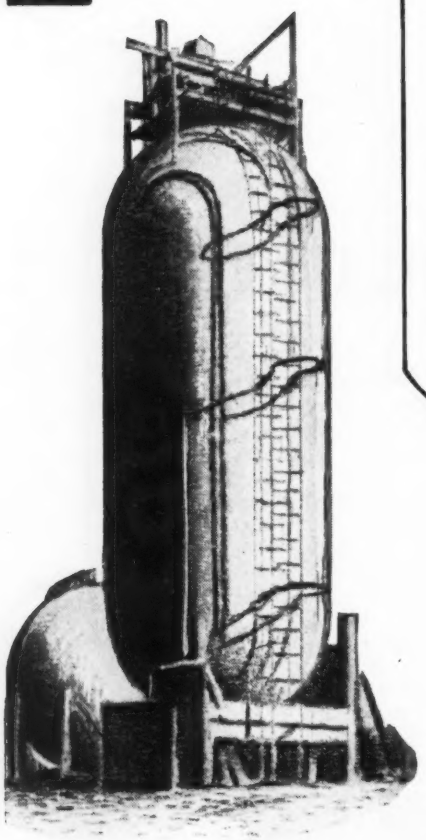


CYCLOHEXANONE

A water-white ketone with exceptional solvent power. The industrial application of cyclohexanone is based largely on its powerful solvent action for a wide variety of materials including crude rubber, some of the synthetic elastomers, natural and synthetic resins and gums, cellulose ethers and esters, and especially for many vinyl chloride polymers and copolymers.

SPECIFIC GRAVITY: 0.941 to 0.945 at 25°C/15.5°C

REFRACTIVE INDEX: 1.446 to 1.451 at 25°C

DISTILLATION RANGE: 5% to 95%; 2.5°, including 155.6°C

COLOR: Water White

ACIDITY: Neutral

EFFECT ON METALS: Non-corrosive

RESIDUE FROM EVAPORATION: None

FLASH POINT (Approximate): 47°C (116.6°F)

SOLUBILITY IN WATER (Approximate): 8-9% at 20°C

CONTAINERS: Tank cars, 50-55 gallon non-returnable steel barrels and small containers.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

Barrett

Hooker CP-40, A New and Improved Chlorinated Paraffin

In formulations for flame and water repellency where 40% Chlorinated Paraffin may be used, here is a new and improved Hooker product. It is an exceptionally stable, light colored viscous liquid with an extremely low iron content.

Hooker specialized experience in chlorinating long chain aliphatics has resulted in the development of this improved product. CP-40 is compatible with a number of film forming resins, and may be used as a plasticizer or extender with them. Technical Data Sheet No. 731 which more completely describes CP-40 is available when requested on your company letterhead.

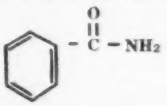
Physical Properties CP-40

Chlorine Content	42 ± 1%
Specific Gravity, 15.5°/15.5°C	1.185 ± .01
Viscosity at 210°F (Saybolt Universal)	160 to 180
Acidity as HCl	0.006% max.
Iron	10 ppm. max.
Color, Union Colorimeter ASTM	1.5 to 2.5
Thermal Stability (6 hours at 300°F)	0.15% HCl max.

Where the formulation calls for a 70% chlorinated paraffin, Hooker CP-70 is available for similar uses. This material is a brittle amber colored resin. It is crushed and shipped as a white powder which does not agglomerate on standing.

HOOKER RESEARCH *Presents*

BENZAMIDE



Benzamide (Amide of Benzoic Acid) is a white, free-flowing monoclinic crystalline material.
Its physical and chemical properties suggest its application in the fields of organic synthesis, including plastics, pharmaceuticals and dyestuffs. It is compatible with a limited number of resins including cellulose acetate and nitrocellulose with which it forms a firm transparent film.
For more complete information write on your letterhead for Technical Data Sheet No. 361 which lists the physical properties and a number of the reactions which Benzamide will undergo.

Because of its relative chemical inertness CP-70 is suggested also in formulations for fireproof paints, adhesives, linoleum, etc. In protective coatings and paints it does not adversely affect the rate of drying. Technical Data Sheet No. 763, describing more fully the properties of this chemical, is available when requested on your company letterhead.

Physical Properties CP-70

Analysis (typical)	
Chlorine	69 to 73%
Free HCl	0.05 max.
Iron	0.01 max.
Softening Range	90°to 100°C
Acid Number, mg. KOH/gm	0.50 max.

HOOKER ELECTROCHEMICAL COMPANY

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New York, N. Y • Wilmington, Calif. • Tacoma, Wash.

Caustic Soda Muriatic Acid Sodium Sulfide
Paradichlorbenzene Chlorine Sodium Sulfhydrate

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8318

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A Job for Good Men

by ROBERT L. TAYLOR, editor

ALMOST SIMULTANEOUSLY LAST MONTH U. S. technical and industrial audiences heard three prominent scientists call for increased effort to replenish our war-depleted store of scientific capital in this country.

In the Waldorf-Astoria Hotel in New York, Dr. Carroll A. Hochwalt, director of Monsanto's Central Research Department, told members of the National Industrial Conference Board, "During the war we were using up our scientific . . . resources without adding to them. It therefore behooves us in industry to sponsor and encourage more fundamental research." At the neighboring Biltmore a day later, Dr. Robert P. Russell, president of Standard Oil Development Company, accepted the Gold Medal of the American Institute of Chemists with the admonition that "to be secure as a nation we must be able, quickly, to place at the disposal of our military . . . an adequate stockpile of basic scientific knowledge." The same day in Pittsburgh, President Karl T. Compton of the Massachusetts Institute of Technology was telling the George Westinghouse Centennial Forum that for security against both aggression and depression "there is no element more important than to have the most adequate possible complement of well-trained scientists."

Not only in the United States, but throughout the world, science and scientists by virtue of their wartime accomplishments have gained a voice that is being heard by people and governments alike with new respect. Science is being accorded a place on the agendas of national affairs.

In London a British Government committee for investigating that country's scientific needs has just recommended that, as an initial step, means be provided to double the normal number of science graduates from British universities. Behind their iron curtain the Russians are desperately trying to make up for lost time in their development of atomic energy and other branches of basic and applied science.

In our own country, too, we are seeing action as well as words. Secretary of War Patterson did not stop with his public acclaim of the Office of Scientific Research and Development as the group which "more than any one agency" contributed to victory in World War II. He has announced that the War Department will form its own private OSRD on a permanent basis, to be known as the Research and Development Division, with a director of general staff rank. The Navy established a similar office over a year ago to contract with private and public institutions for fundamental research. On a broader scale, one of the several much-publicized bills providing for a National Science Foundation and large additional Government funds for research seems certain of passage by Congress this year or next. Industry likewise is stepping up its scientific activities. It plans to at least double its prewar appropriation for research and is building a number of large, new, well-equipped laboratories for the purpose. To keep step, colleges and universities are increasing their plants for both research and teaching.

All this is good, we believe, for science, industry, and the general public. We wonder, however, if adequate provision is being made for one phase of the program in this country.

Anyone who has had experience with research knows that results are not determined by the size of the laboratory or amount of equipment. The important element is brainpower. Without competent personnel, any laboratory is a delusion and an extravagance.

To turn out the number of high quality scientists needed in this country during the next ten years will require a good many more top technical men in teaching positions than we now have. The disturbing part of the picture is that the financial incentives needed to attract such men just do not exist in most schools. And as salary levels continue to go up elsewhere, the prospects that they ever will exist without outside help seem to be getting worse instead of better.

This is a problem for which some solution must be found if we are to carry out effectively the plans we are so ambitiously laying for scientific development in this country. We must have not only quantity but quality of young men, men who are proficient technically and who also possess the foundations for full development professionally. To get such men it is imperative that we have good teachers.

In our enthusiasm for pushing back scientific frontiers, we must not forget that the first step is to provide enough and capable scientists.

Coal Strikes and Chemicals

FOR MOST INDUSTRIES COAL IS merely a source of energy. But for the chemical industry it is both an energy source and a source of raw materials, either via water gas, as in the production of methanol and ammonia, or via the various chemical intermediates prepared from coal tar.

Thus for many chemical producers a coal strike such as the one we have just seen is a double barreled blast that can put a serious hole in the year's operations. These producers are brought to a stop along with other industry because of lack of fuel, and they are then delayed in resuming production because of shortages of one or another coal-based material.

If a pattern of recurring strikes is to become characteristic of the coal industry—and Mr. Lewis' United Mine Workers don't seem to be showing any signs of letting up—manufacturers of chemicals based on coal may well pause to consider. The petroleum industry, so far relatively free of strike interruptions, is waiting with well-financed and well-operated laboratories to aid in providing alternate raw materials. Already petroleum or natural gas is being used successfully for the commercial production of synthetic ammonia, phthalic anhydride, cresylic acid and cyclohexane, all materials which at one time were produced wholly from coal.—HWZ.

Selling the "Scientific Method"

HISTORY IS A LOGBOOK OF HUMAN CALAMITIES. A glance at the daily newspapers suffices to show that the problems of government, of economics—of the whole vast field of human relationships—are about as far from solution now as ever they have been.

Problems regarding human beings are unquestionably more complex than problems of matter and energy.

We suggest, however, that those in authority over the problems of humanity might learn something from the scientists. Especially might they learn the basic tools of science, the "scientific method," which is to search conscientiously for all the facts and reason from them to a just and unprejudiced conclusion. In a democracy, "those in authority" include not only the leaders, but all the people.

But do the people listen to the scientists? On the contrary. Any demagogue can win support for a half-baked idea if he has enough pat phrases, half-truths, and specious but plausible arguments at his command. The scientists, on the other hand, may be able to detect the fallacies, but he can't put his ideas across to the average man. He is unable to show that logic, the motive force of the natural sciences, might be equally useful in solving the problems of social sciences.

Francis C. Frary, director of Alcoa's research laboratories, put his finger on one phase of the problem in a recent speech before the Pittsburgh Section of the American Chemical Society. He asserted that the chemist has not been taught, by benefit of a truly liberal education, to speak to the layman in language he understands.

Without the broad foundations of a liberal education, he continued, the chemist tends to become a skilled technician rather than a professional man. "He needs to cultivate the art of looking at his scientific work from the standpoint of the man who is ignorant of it but skilled and interested in some other line, and who will not give too much time or attention to understand what the chemist is trying to say.

"The failure to consider the limitations and viewpoints of other people, because of absorption in the minutiae of his own problem, appears to be the basic reason for the lack of clarity of expression and presentation which is such a common fault of the technical man."

It is a serious indictment of our educational system if it is turning out skilled technicians at the expense of literate and articulate scientist-citizens.—HCEJ.

Recognition for Researchers

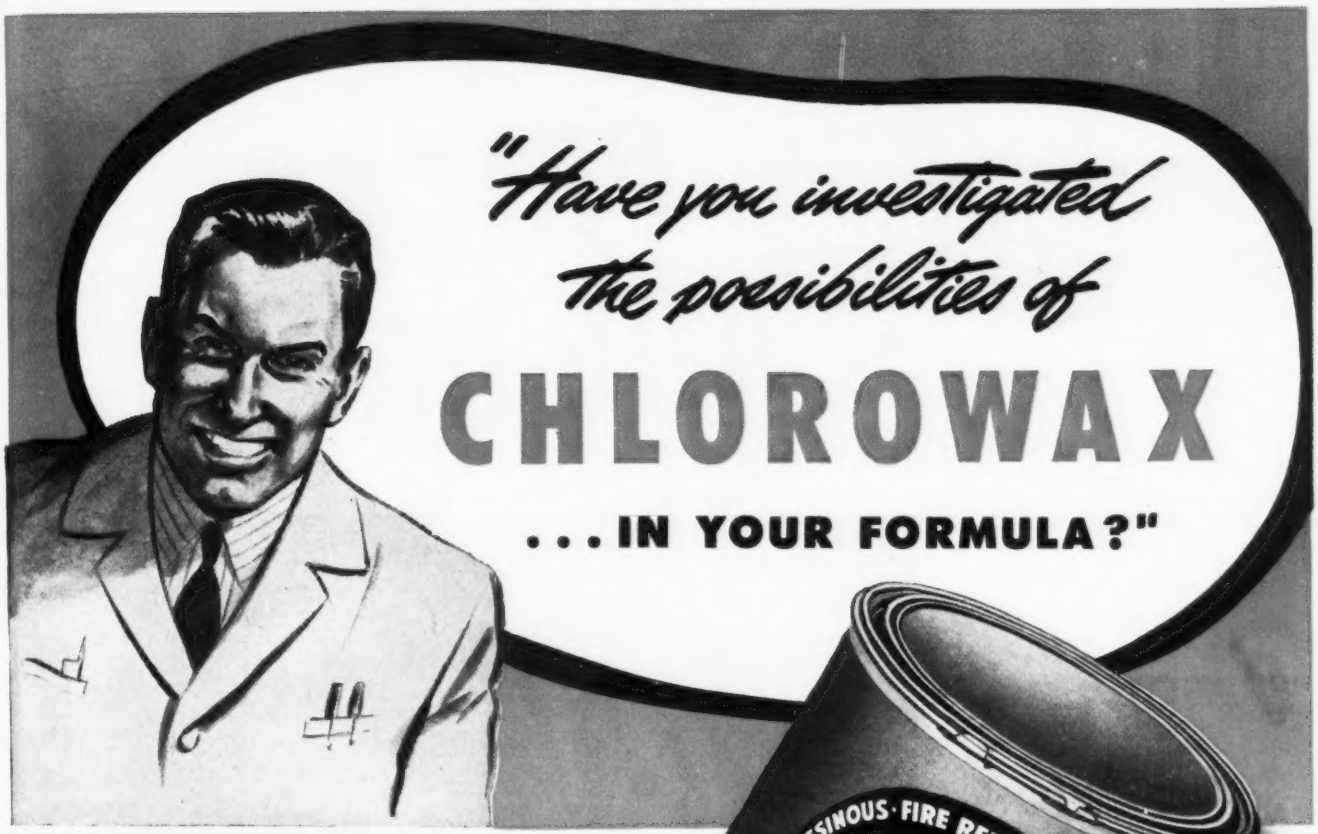
IT IS AXIOMATIC THAT A PRIME RESPONSIBILITY of management is to position key personnel so that their capabilities may be of maximum worth to the company. And, correspondingly, to promote individuals, as they develop, to more responsible positions for which their experience particularly fits them.

In general, such a policy has been practiced throughout most categories of the chemical industry. But one major exception has long existed—in the field of research. How could the outstanding work of a scientist be recognized? Bonus systems, especially when research projects are assigned, are difficult to administer fairly. So, one course is usually followed: advancement to a supervisory or administrative post.

Often such action proves unsatisfactory, to the technologist and to the company. Both suffer. Many imaginative, competent researchers are not capable administrators; they loath supervisory work; their research abilities are lost to the organization.

We commend, therefore, the rather similar policies recently initiated by both Calco and Du Pont in creating a series of research positions carrying the title of Research Associate and Research Fellow. Designed to make research as a career as attractive as the administrative field in industry, new opportunities in salary, prerogatives, and responsibilities are made available to those whose achievements have been meritorious. The scientists so honored will enjoy considerable latitude in the selection and pursuance of research endeavors, unfettered by onerous administrative duties.

Broader adoption of policies of this type may be the answer to many of the personnel problems of the research laboratory. It can raise research up to where it belongs as an integral, fundamental part of industry. It can render research dollars more fruitful, by optimum utilization of abilities, and the provision of a concrete incentive for research personnel. Too, more scientists may be encouraged to enter industrial research as a career when a clearer path of progress exists.—WAJ.



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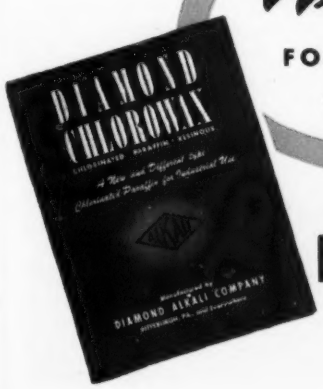

A Few Suggested Uses

Interior and exterior paints . . . varnishes and lacquers . . . textile coatings . . . wood impregnation . . . polishes . . . floor coverings . . . glues and adhesives . . . paper coatings and many other uses. Investigate the possibilities of Chlorowax now, for use with your products.

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Isopropylamine is suggested for use in the preparation of dyestuffs, rubber chemicals, insecticides, explosives, corrosion inhibitors, pharmaceuticals, photographic chemicals, textile specialties, and surface-active agents. Perhaps it is the logical starting material for *your* new product.

Isopropylamine is a liquid under ordinary conditions and it may be obtained in a 98-100% grade or as an aqueous solution containing 50-5[illegible]% amine. Our Technical Service Division will gladly send additional data and give you every possible assistance. Write today.

PROPERTIES OF ISOPROPYLAMINE (98-100% AMINE)

Molecular Weight	59.11
Boiling Point, C	31.9
Melting Point, C	−101.2
Flash Point, Tag Open Cup	
C	−26
F	−15
Specific Gravity, 25 C/4 C	0.686
Refractive Index, 20C	1.3763
Ionization Constant	K=5.3x10−4
pH of 0.1 Molar Aqueous Solution	11.57
Color	Water White

Vapor Pressure	Temp C	mm Hg
	10	308
	20	478
	30	718
	40	1030
	50	1500

Solubility . . . . . Miscible with water, alcohol, and ether

COMMERCIAL SOLVENTS
Corporation
17 East 42nd Street, New York 17, N. Y.

Chemical Industries
JUNE, 1946

Axis Manufacture of HYDROGEN PEROXIDE

by Comm. R. A. COOLEY, U.S.N.R.*

AS FAR AS PRODUCTION OF 35 PER CENT HYDROGEN PEROXIDE GOES, the Axis methods represent nothing particularly new or startling, but the concentration to 80 to 90 per cent by vacuum distillation on an industrial scale is an engineering accomplishment in which Germany led the world. Aside from its wartime use as a fuel component, concentrated hydrogen peroxide offers some interesting possibilities as an industrial oxidizing agent.

ONE of the new developments of World War II was the large scale manufacture and use of 80-90% hydrogen peroxide by Germany and Japan. (For availability in U. S. see CHEMICAL INDUSTRIES, pg. 82, Jan., 1946.) The Germans, who started serious research on this possibility as early as 1936, were the first to exploit the military applications of concentrated hydrogen peroxide. The results of the research were highly valued and were effectively kept secret although the Germans sold the manufacturing details at a good price to Japan prior to August, 1944. The Japanese eagerly grasped the German information and immediately began manufacturing and developing concentrated hydrogen peroxide for military use. Japan trailed Germany in quantity of production and successful use, but at the time of surrender Japan was probably producing many times more 80-90% hydrogen peroxide than the United States.

The manufacture or use of hydrogen peroxide concentrated above 30% by weight probably had not gained widespread or effective interest in the United States for two reasons: (1) As far as Americans knew concentrated hydrogen peroxide had not been proved under practical conditions to be extraordinarily valuable, and (2) The hazard in manufacture, storage, and use was not known but was perhaps unduly respected.

USES

As a fuel component concentrated hydrogen peroxide is attractive because it is a liquid of reasonable density (1.34 at 20° C. for 80% H_2O_2), an oxidant which leaves essentially no residue, and as it is relatively free from water it will react rapidly and completely with many organic compounds. For use in submarines and torpedoes it is particularly convenient as heavy high pressure containers are not required for storage. It can be used by decomposition with a solid catalyst to yield oxygen and steam, reaction with an oxidizing agent such as permanganate ion, or oxidation of such materials as hydrazine or fuel oil.

(Hydrogen peroxide of 90% concentration also offers interesting possibilities to the chemical industry. It is being made commercially in the United States by the Buffalo Electro-Chemical Co., Inc., which states that its solubility in a number of organic media, the high concentration of active oxygen present, and the relative freedom from water make it useful for bulk polymerization of monomers, treatment (e. g. bleaching) of water-insoluble materials such as oils, fats and waxes, and as an oxidizing agent for organic reactions either by itself or through the ready preparation of peracids. Typical applications are epoxidation and hydroxylation reactions. — EDITOR.)

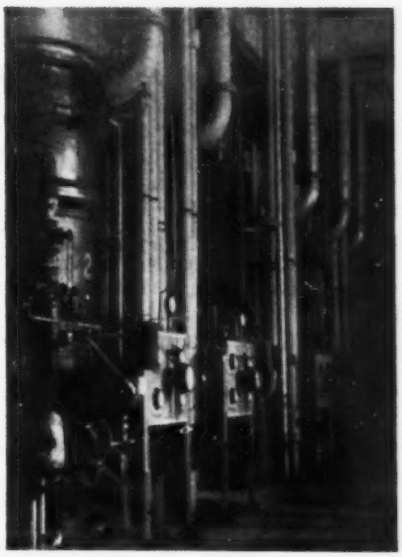


Fig. 1. Distillation equipment at the Schickert plant at Bad Lauterberg. This plant is reported to have a capacity of 1200 metric tons per month of 80-90% hydrogen peroxide.

The use of hydrogen peroxide by the German Navy, Army, and Air Force as a power source was undergoing extremely rapid development at the end of hostilities. Applications included propulsion of submarine, naval and aviation torpedoes, assist take-off units, climbing or accelerating aids for airplanes, jet propelled planes and missiles.

The first applications were based on the reaction of permanganate ion and

* Commander Cooley is at present supervisor of the Propellants Section, Applied Research and Development division of the Explosives Department of the U. S. Naval Ordnance Test Station, Inyokern, Calif. Receiving his Ph.D. in chemistry at California Institute of Technology in 1942, he became connected with the Navy's rocket propellant work there and was later sent to England, Germany and Japan on technical missions for the Navy. This article has been cleared by the Navy Department.

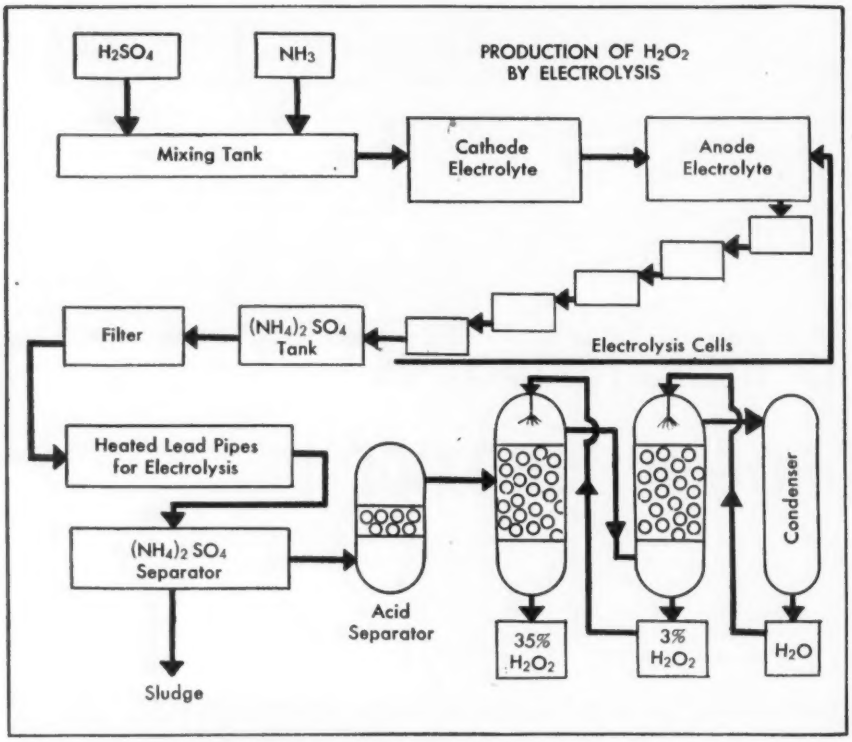


Fig. 2. Flowsheet for production of hydrogen peroxide by electrolysis.

hydrogen peroxide and its subsequent decomposition on the finely divided solid manganese dioxide formed by the reduction of the permanganate ion. This power system was used to drive a turbine which pumped liquid oxygen and alcohol for the V2 rocket, to launch V1 rockets, to drive the radio controlled Hs293 rockets launched from a mother plane, to drive the earliest model of the Me163 jet propelled plane, and to assist plane take-offs.

For torpedo turbine propulsion the Germans avoided the difficulties of solids in the gas by the use of hydrazine hydrate (For manufacture in Germany see CHEMICAL INDUSTRIES, pg. 424, March, 1946.) which has a marked reducing action and reacts according to the equation:

$$2H_2O_2 + N_2H_4 = 4H_2O + N_2$$

Fuels such as decahydronaphthalene burn rapidly and smoothly with peroxide once the reaction has been started. However, a catalyst is necessary to insure safe ignition and smooth burning. The possibility of injecting hydrogen peroxide into submarine Diesel engines was under vigorous investigation in Germany.

The Japanese planned to use concentrated hydrogen peroxide in their version of the German Me263 for a fast B29 interceptor. However, this jet propelled fighter was not beyond the pilot testing stage. The Japanese also used concentrated hydrogen peroxide for the fuel of naval torpedoes.

PRODUCTION OF 80-90% HYDROGEN PEROXIDE

The Germans took elaborate precautions to preserve their methods of manufacture and use of hydrogen peroxide secret. Various cover names, such as Ingolin, T-Stoff, Renal, Aurol, Geprol, Subsidol, Thymol, Oxylin, Neutralin and Perhydrol, were used in referring to concentrated hydrogen peroxide. The production plants were protected by high fences, guards, and in some cases from air raids by smoke producing equipment. In the transfer of the product from plant to place of storage or use a separate train of special aluminum tank cars was generally made up and protected by picked men who stayed with the train throughout its journey.

Table I[1] although not complete shows the order of magnitude of German production. It appears that Germany was actually making about 2000 metric tons per month of 80% hydrogen peroxide at the end of the war. It was estimated that the production in Germany, if there had been no bomb damage, would have reached about 8000 metric tons per month of 80% hydrogen peroxide by September, 1944.

Table II gives information obtained in Japan on production of concentrated and 35% hydrogen peroxide. The best information available indicates that Japan was producing about 600 metric tons of 80% hydrogen peroxide per month shortly before surrender.

Some idea of the cost of producing concentrated peroxide may be obtained from data on the Bad Lauterberg plant built by the Otto Schickert Co., starting in January, 1939. The cost of the plant was 70,000,000 R.M., but it was estimated that the cost in "normal" times would have been only 45,000,000 R.M. The sales price of 80% hydrogen peroxide per kilogram in 1944 was 2.16 R.M. and the cost of producing enough 80% material to correspond to 100 kilograms of 100% hydrogen peroxide was broken down as follows:

Power	1750 KWH @ 0.028		49.00
Steam	2.8 metric tons @ 3.90		11.00
Water	300 cubic meters @ 0.015		4.50
Chemicals			
Maintenance			19.00
Wages	25 man hours @ 1.20		30.00
Overhead, insurance, welfare, etc.			7.20
Depreciation and interest			91.10
Total cost per 100 kg. (100% basis)			325.30 R.M.

TABLE I

GERMAN PRODUCTION OF HYDROGEN PEROXIDE AT END OF WAR
(in metric tons per month)

Company	*Location*	H_2O_2 *30-40%*	H_2O_2 *80-90%*
Schickert	Bad Lauterberg		1200[2] (900 Mar. 44)[2] (188 Mar. 44)[2]
Electrochemische Werke	Hollriegelskreuth		
Degussa[3]	Rheinfelden	300' (480 Mar. 44)	
Henkel & Co.	Dusseldorf	300' (148 Mar. 44)	
Electrochemische Werke	Munich	250'	
Electrochemische Werke	Kufstein	50' (171 Mar. 44)	
Kali Chemie	Berlin	(148 Mar. 44)	
Austria Chemie Werke	Weisenstein	(141 Mar. 44)	
Degussa[3]	Weisenstein, Austria	50'	
I. G. Farbenindustrie	Heydebrecke ⅓ finished		2000 planned
I. G. Farbenindustrie	Waldenberg ⅓ finished		2000 planned
Schickert	Rhumspringe ⅓ finished		1800 planned

[1] Estimated by Otto Schickert.
[2] Does not include 80% material made from 35% material produced elsewhere.
[3] Deutsche Gold und Silber Scheide Anstalt.

TABLE II

JAPANESE PRODUCTION OF HYDROGEN PEROXIDE
(in metric tons per month)

Manufacturer	*Place*	H_2O_2 *30-40%*	H_2O_2 *80-90%*
First Naval Fuel Depot	Ofuna		300
Second Naval Fuel Depot	Yokkaichi	2,040	1,100
Nippon Chisso Hiryo K.K.	Konan		1,000
Teikoku-Jinken Mfg. Co.	Nihara, Guakuin	1,000	
Edogawa K.K.	Yamakita	520	>18[2]
Sumitomo Chemical Mfg. Co.	Osaka, Tsuruaki	440	
Nisson Chemical Mfg. Co.	Toyama	400	
Kanto-Asahi Chemical Mfg. Co.	Shikukawa	360	
Showa Denko Mfg. Co.	Yokoyama, Toyama	320	
Six Other Plants		760	

[1] Installed capacity.
[2] The Edogawa Company's Yamakita factory produced 18 metric tons of 80% hydrogen peroxide in May 1945, but was not operating on a 24 hour schedule.

At an exchange rate of $0.40 per R.M. the cost of 80% hydrogen peroxide corresponding to one pound of 100% hydrogen peroxide would be $0.41.

MANUFACTURE

Four hydrogen peroxide manufacturing methods used in Germany were:

1) Electrolytic preparation of persulfate for later reaction with water.
2) Electric discharge in the presence of hydrogen and oxygen gas and water vapor.
3) Use of easily oxidized organic materials such as 2-ethyl anthraquinone.
4) The reaction of barium peroxide with sulfuric acid.

The first method was the one used most and like the others represents no new or startling discovery as far as the production of 35% hydrogen peroxide goes, but the concentration to 80 to 90% by vacuum distillation on an industrial scale represents an engineering accomplishment in which Germany led the world. These methods with the exception of 4) will be discussed below. The Kali Chemie Company of Berlin is thought to be the only company which used method 4) and as shown by Table 1 produced a relatively small amount.

35% HYDROGEN PEROXIDE BY ELECTROLYSIS

$$2NH_4HSO_4 + \text{power} = (NH_4)_2S_2O_8 + H_2O \quad (1)$$

$$(NH_4)_2S_2O_8 + 2KHSO_4 = K_2S_2O_8 + 2NH_4HSO_4 \quad (2)$$

$$K_2S_2O_8 + 2H_2O = 2KHSO_4 + H_2O_2 \quad (3)$$

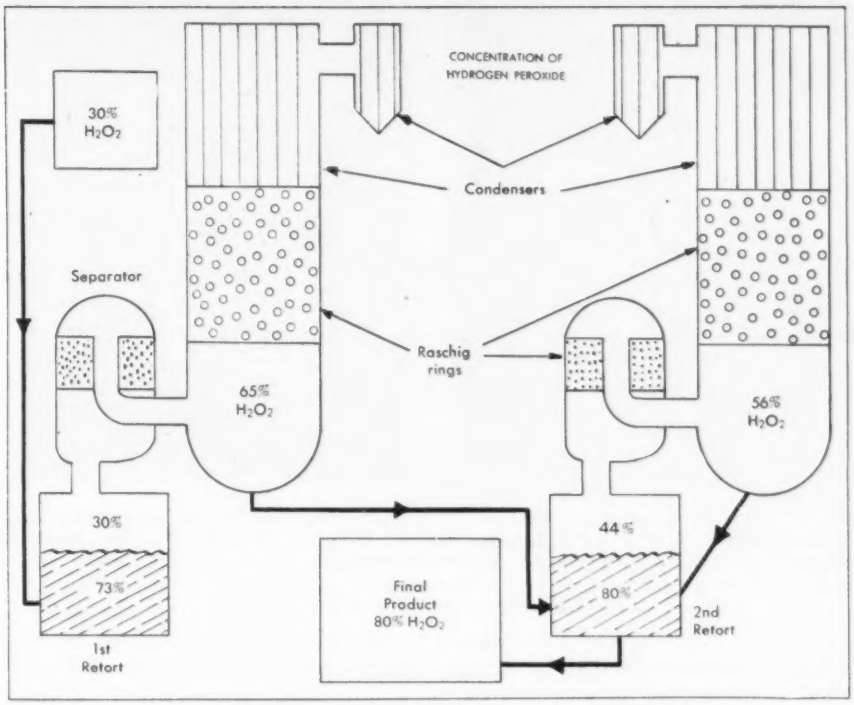


Fig. 4. Flowsheet for concentration of hydrogen peroxide.

Electrolysis of ammonium acid sulfate in sulfuric acid solution yields ammonium persulfate which by metathesis with potassium bisulfate produces relatively insoluble potassium persulfate. The potassium persulfate is hydrolyzed with live steam and the resultant vapors are rectified under reduced pressure and condensed to yield an aqueous solution of hydrogen peroxide.

Forty-four porcelain electrolytic cells about 95 cm. long, 70 cm. wide and 95 cm. deep were used, generally in series with 230 volts. Four of the cells were usually out of operation for maintenance, making voltage of each cell about 5.7 volts, 5,400 amperes were utilized at a current efficiency of 85%. Ammonium thiocyanate (0.1 gram per liter) was placed in the electrolyte to increase the oxidation tension or overvoltage. There were six blocks of electrodes and glass cooling tubes in each cell. Each block contained fourteen platinum wire anodes supported by rubber covered aluminum tubing and thirty graphite rod cathodes wound with blue asbestos rope to serve as a diaphragm. The electrodes were so arranged that each anode was surrounded by four cathodes with an effective minimum distance of about 5 mm. A forced air current above the cells maintained the hydrogen gas concentration below 5%.

A filter removed graphite, asbestos, etc., from the electrolyzed solution, which was cooled by a vacuum cooler in which about 2% of the water was removed and the temperature decreased from 30° C. to about 26° C. The product then passed to a converter where reaction (2) above was carried out. The potassium persulfate was separated by a centrifuge before steam distilling in a porcelain retort, The resultant vapors were rectified at a pressure of about 38 mm. mercury to produce a 35% solution of hydrogen peroxide which served as stock for the preparation of concentrated hydrogen peroxide.

Although the sulfuric acid recovered from the solution contained about 10 mg. per liter of such metals as iron and aluminum, the iron content was reduced to less than 5 mg. per liter before reuse by precipitating Prussian Blue from the solution. This step also removed the platinum content.

As is shown in the flow sheet of Fig. 2 the Japanese hydrolyzed the ammonium persulfate directly without the intermediate separation of potassium persulfate.

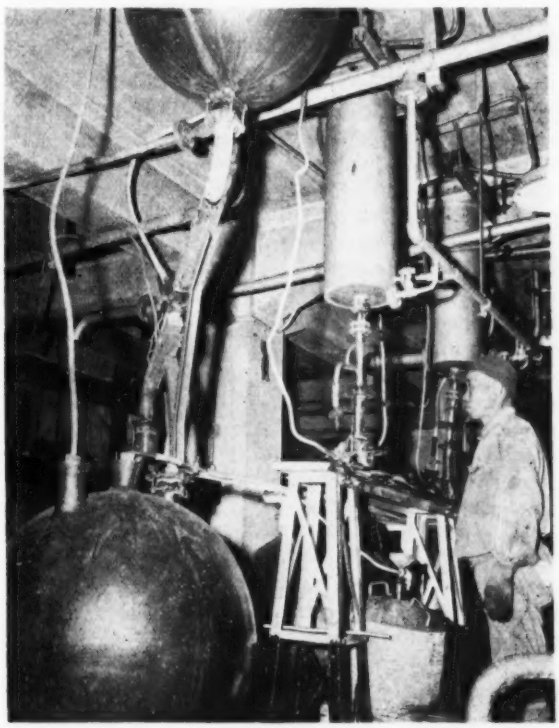


Fig. 3. Tin condensers and receivers for 35% hydrogen peroxide and 3% hydrogen peroxide in a Japanese plant.

PRODUCTION OF 35% H_2O_2

The concentration of 35% to 85% hydrogen peroxide represents the advance of German production which is of the greatest interest. The procedure varies a little from plant to plant so the details presented, which are those characteristic of the Schickert plant at Bad Lauterberg will be generally applicable.

For the concentration step, two similar units were placed in series (Fig. 4). Each unit consisted of a steam-heated retort, a Raschig ring separator, a Raschig ring rectifying column, a surface

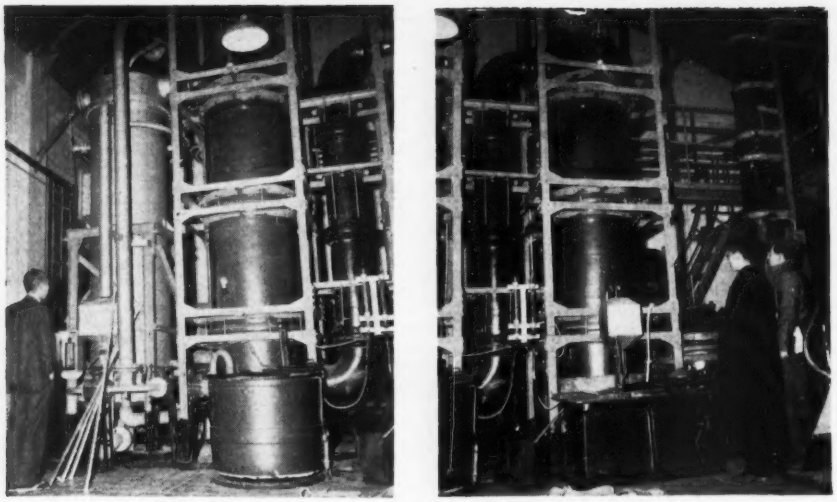


Fig. 5. From left to right may be seen the condensers and second and first Raschig ring columns in the Japanese Yamakita plant for the production of 35% hydrogen peroxide. The ammonium sulfate separator may be seen in the lower part of the first picture.

condenser, a vacuum pump and a barometric condenser with trap. Porcelain was used except for the aluminum condensers and polished Krupp VI4A stainless steel (18% Cr, 8% Ni, 5% Mo) heating coils of the concentration retorts. The separator and columns were about one meter in diameter and contained about 0.5 and 4 meters of ceramic Raschig rings respectively.

Ammonia was used to reduce the sulfuric acid content of the 35% hydrogen peroxide produced by the Pietsch process from 2 grams per liter to 0.5 grams per liter. The 120 mg. of ammonium pyrophosphate per liter were then added as a stabilizer.

The stabilized solution was fed continuously into the retort (pressure 40 mm. Hg) where the liquid was at 66°C. The liquid phase contained 73% hydrogen peroxide and the concentration in the vapor phase was 30%. Non-volatile impurities remained in the retort, the vapors passing through the separator into a rectifying column where they were scrubbed with distilled water recovered from the surface of the condenser. The amount of water introduced was so adjusted that the product leaving the bottom of the column was 65% hydrogen peroxide. The loss of peroxide leaving the top of the column was negligible.

For further concentration the 65% product was passed continuously into a second retort (pressure 40 mm Hg) in which the temperature of the liquid was 75°C., the liquid phase being maintained at 80% hydrogen peroxide while the concentration in the vapor phase in the retort was 44%. The vapor from the second retort was passed into the second column (56% hydrogen peroxide at the bottom) and was returned to the second retort to maintain constant conditions. The final 80% product was withdrawn from the second retort, cooled, and stored after the addition of 23 mg. of 87% phosphoric acid per liter as a stabilizer.

After about a week's operation the impurities ($AlPO_4$, $(NH_4)_2SO_4$, $KHSO_4$, $Na_4P_2O_7$, etc.) in the first retort reached a solid content of 80 grams per liter which is near the dangerous concentration and was the source of flashes of light within the retort which necessitated shutting down the retort, draining, and flushing with water.

The overall efficiency of the conversion from 35% hydrogen peroxide to 80-90% hydrogen peroxide was about 98%.

The specified maximum residue on ignition of the concentrated hydrogen peroxide was 20 mg. per liter, but for some applications it was desired to reduce this figure to 5 mg. per liter and plans drawn for an additional distillation step as a solution.

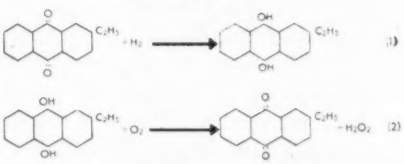
HYDROGEN PEROXIDE BY ELECTRIC DISCHARGE

Since 1931 the Electrochemische Werke had worked on the development of a process for the direct synthesis of hydrogen peroxide from hydrogen and oxygen. Ten, twenty, and ten thousand watt units had been constructed and calculations completed for a two million watt unit. This method has the attractions of an exceptionally pure product and relatively little labor since the controls of the apparatus are automatic (USP 2,015,040, ass'd to Elektrochemische Werke).

The cyclic process based on the combining of hydrogen and oxygen can be explained by reference to Fig. 6. Oxygen, hydrogen and steam were mixed at a little more than atmospheric pressure by blower A and were then forced through a heat exchanger to the ionizing chamber B. Due to the electric discharge here part of the hydrogen was atomized and ionized. The ionizing chamber B was made of a number of parallel quartz plates 5 mm. thick and 500 mm. square, one side of which was etched with hydrofluoric acid and the other side of which had electrically connected aluminum coatings. The plates were connected electrically in parallel and were separated by 5 mm. from each other with the etched sides facing. Twelve thousand volts of 9,500 cycle AC was used with a working density of 0.96 kilowatts per pair of plates. The gas mixture in the ionizing chamber had a water vapor pressure corresponding to water at 60°C. and the average temperature of the gases was 160°C. The hydrogen peroxide formed in the ionizing chamber was swept out with the other gases through a heat exchanger to the rectifying column containing Raschig rings. A condenser E was at the top of the column and at the point F distilled water was introduced. From the trap G a very pure 10% solution of hydrogen peroxide flowed. The necessary hydrogen and oxygen were introduced at the point H. Automatic controls were used so that the oxygen content was maintained at 5% with very little labor. The energy efficiency was such that the equivalent of about 25 grams of 100% hydrogen peroxide was produced per kwh.

HYDROGEN PEROXIDE THROUGH 2-ETHYL ANTHRAQUINONE

A potentially promising method of hydrogen peroxide production found under serious investigation in Germany utilized the following reactions:



It has long been known that reactions involving the oxidation of easily oxidizable organic materials and extraction of the resulting hydrogen peroxide with water could be used in the laboratory. The I. G. Farben plant at Ludwigshaven was capable of producing one metric ton

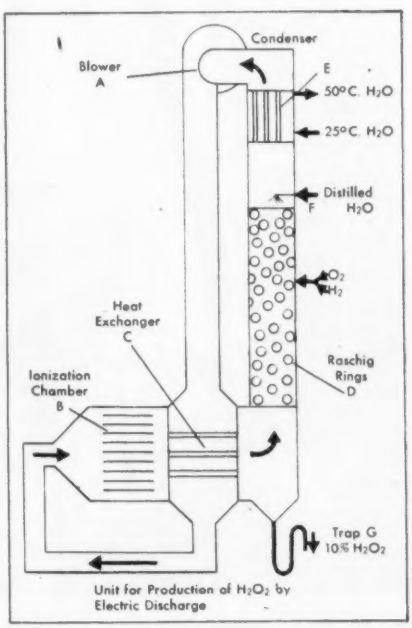


Fig. 6

of hydrogen peroxide per day through 2 ethyl anthraquinone calculated on the 100% basis and had operated for several months before it was bombed out.

In the one ton per day unit 15 cubic meters of solution were used and the total time of circulation for one cycle was two hours. One fourth of the solution was in the reductor, one fourth in the oxidizer and one half in the other vessels. Reaction (a) above was carried out at room temperature by passing hydrogen through 2-ethyl anthraquinone dissolved in a one to one mixture of thiophene-free benzene and cyclohexanol containing Raney nickel. However, it was reported that higher aliphatic alcohols (C_7-C_{11}) were preferable. Only enough hydrogen was added to the aluminum reductor to reduce one half of the quinone to the hydroquinone as the presence of a hydroquinone and a quinone results in the formation of a quinhydrone which increases the solubility of the hydroquinone. After filtering, the hydroquinone solution was placed in an enameled iron oxidizer where reaction (b) was carried out by bubbling oxygen through the solution, causing the temperature to rise from about 30°to 37°C. The resulting solution of hydrogen peroxide and anthraquinone was introduced into an enameled iron tank to which iron-free water was added, the hydrogen peroxide passing into the water layer at the bottom of the tank from which it was drawn off as a 20% solution into aluminum containers. The pH of the hydrogen peroxide solution was about 6.0 and for stabilizing purposes 20 mg. of Na_2SnO_3 per liter and 30 mg. of NH_4NO_3 per liter were added. After the water was drawn off the quinone solution contains 0.1 to 0.3% water and is 0.01 normal in hydrogen peroxide. Both water and peroxide are removed before recycling.

Plans had been drawn for the construction of a plant producing eleven tons per day. Although this plant was not constructed it appears that the feasibility of large scale production of hydrogen peroxide with relatively simple and inexpensive equipment by a non-electrolytic method has been fairly well established.

STORAGE

To improve the stability of stored concentrated hydrogen peroxide attempts were made (1) to find stabilizers to add to the liquid and (2) to find new materials for containers or new methods of stabilization. Phosphoric acid (120 to 150 mg. per liter), sodium pyrophosphate (100 to 300 mg. per liter) were some of the stabilizers in use. In one case when, due to decomposition, the rise of temperature of a tank car of concentrated peroxide was not stopped by spraying water on the car, addition of one liter of 8% phosphoric acid per cubic meter of peroxide was found effective.

The materials used for containers of concentrated hydrogen peroxide include aluminum, tin, porcelain, glass (pyrex or Jena rather than the soft variety from which hydrogen peroxide will leach the alkali) and polyvinylchloride based plastics (Vinnol, Mipolam, Igelite, etc.) with dibutyl phthalate or tricresyl phosphate as plasticizer. For heating coils and the parts of pumps which came in contact with the liquid, polished V2A, V4A (18% Cr, 8% Ni, 2.5% Mo), or V14A (18% Cr, 8% Ni, 5% Mo) stainless steel manufactured by Krupp was used. It could be used for containers, but it is expensive and difficult to work. Aluminum with its safety, low cost and ease of working is probably the most suitable construction material. However, it should be at least 99.5% aluminum with the minimum of iron, copper, and manganese.

Fig. 7. Crude Japanese mixing tank for sulfuric acid and ammonia. The ammonia cylinder is shown at the lower left hand corner with a flexible tube leading to the worker's hands. Note the corrugated metal construction.

Various procedures ware developed for conditioning the inside of containers such as the 10 and 20 metric ton railroad tank cars whose tanks were required to contain at least 99.5% aluminum and not more than 0.5% silicon and iron, 0.03% titanium and 0.05% copper and zinc. Generally these procedures were aimed at making the aluminum surface satin smooth and free of scratches. The clean surface was usually treated with a 10% sodium hydroxide solution followed by 20 to 30% nitric acid for 24 hours. The tank was then washed with pure water (less than 1 mg. iron per liter). Since the oxide coat produced on the aluminum by the pickling is somewhat porous, some attempts were made to reduce the large effective catalytic surface by filling the pores with a wax of iodine number less than 0.5. However, this process is laborious and its value did not appear to be well established. New tank cars were allowed to stand overnight with 30% peroxide before being filled with 80% peroxide. A peroxide storage tank improves with age, perhaps due to the formation of a thicker protective oxide layer or due to continued attack on impurities by the peroxide.

Although it was necessary to use plastics in the handling and storing of hydrogen peroxide where flexibility was required, none was as satisfactory for storing as the above metals.

Carefully prepared 80% peroxide stored in aluminum tanks (100 metric tons and smaller) outdoors was said to show a loss of only about 1% per year, almost all of which occurred in the first month. Shipment to and storage in the tropics appears to be practical.

The theory of the stability of peroxide in containers is not completely worked out but the stability of strong hydrogen peroxide appears to vary more or less directly with its purity and inversely with its heavy metal content. Phosphate ions are presumed to improve stability by rendering ions of iron, aluminum, etc. insoluble. It may be that pure hydrogen peroxide is a non-ionizing solvent whose activity would be expected to decrease as the water content is reduced.

(According to a report appearing recently in the Industrial Bulletin of Arthur D. Little, Inc., the 90 per cent product being produced commercially in the United States "is said to show practically no loss of hydrogen peroxide content during normal storage over a period of months. Shock, as from a blasting cap, reportedly does not detonate it. It can be shipped and handled in the conventional manner in aluminum drums and tank cars. Spillage should be avoided because contact with combustible matter may cause a fire, though such fires can be easily extinguished with water."—EDITOR.)

SUMMARY

Through the urge of military demands German technicians have demonstrated that 80 to 90% hydrogen peroxide may be manufactured and transported or handled with relative safety.

With the complete details of the German industrial procedure for manufacturing concentrated hydrogen peroxide readily available the price of 80 to 90% hydrogen peroxide in the United States should decrease.

Valuable military uses of concentrated hydrogen peroxide may be found in the United States and a new important role for it in chemical industry may appear.

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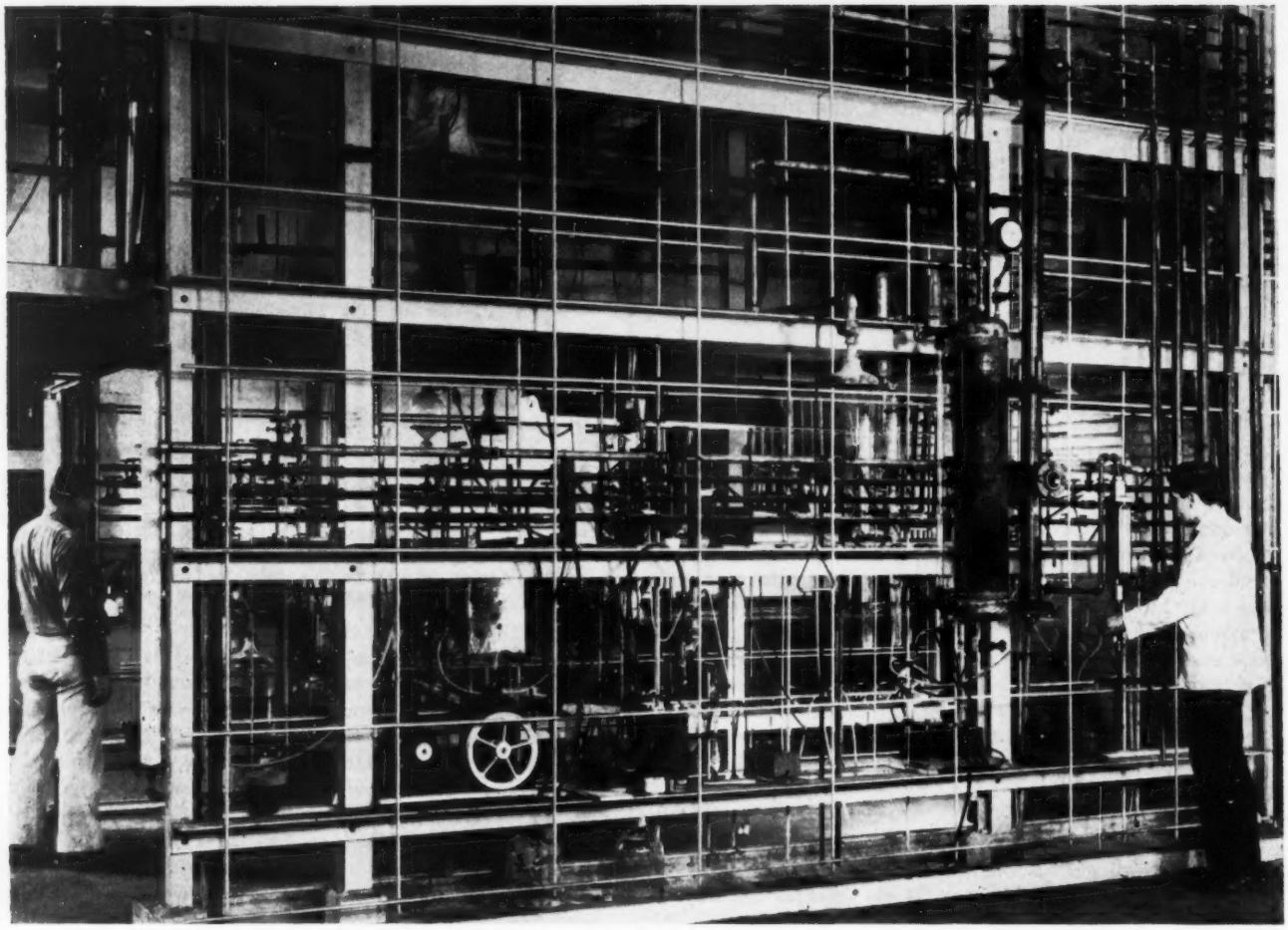


General view of rack showing a steel unit in the "five-gallon range" for gas absorption in a tower.

New Mini-Plant Aids in Continuous Process Development

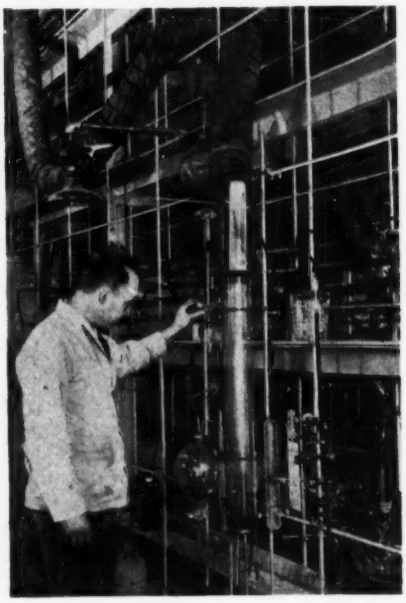
by W. F. WALDECK, Chemical Engineering Supervisor
Research Department, Wyandotte Chemicals Corp.
Wyandotte, Michigan

DESIGNED TO PROVIDE facilities intermediate between laboratory and pilot plant, Wyandotte Chemical Corporation's new mini-plant duplicates continuous process conditions at an appreciable saving of time and money over full pilot plant scale. It also furnishes a convenient place for the preparation of materials in the inconvenient five-gallon quantity range.

THE WORD "mini-plant" was first coined some years ago by Dr. T. H. Vaughn, Director of Research for Wyandotte Chemicals Corporation. It is an apt designation to cover the gap between conventional laboratories and pilot plants and is a foreshortening of the term, "plant for process study on a miniature scale."

In the development of its pilot plant facilities the Wyandotte Chemicals Corporation found an increasing need for facilities intermediate between those of ordinary laboratories and pilot plants. Construction of a mini-plant to supply that need has been completed and the laboratory placed in operation under the immediate supervision of Dr. J. R. Heard.

The main function of the new mini-plant is to develop on a small scale continuous processes for new products that have been developed in originating laboratories, whether organic or inorganic. Too often in the past, pilot plants have been built on a batch basis and the decision made to go to a continuous operation because of expanded estimates of production after the piloting was completed. For this reason and because of the traditional application of continuous operation in alkali manufacture, even relatively small projects can be profitably studied in this



Spot ventilation is provided by flexible duct that can be brought to any point on the rack.

laboratory for development of data on continuous operation. Such study will in general precede any pilot plant design and will obviously make that design much better.

RACK TWO STORIES HIGH

The main feature of the mini-plant is a two-story rack that is a glorification of the conventional rack used in organic laboratories. The unit consists of two individual double racks, each nineteen feet high and twenty feet long, seven feet apart. A cat walk five feet wide is carried between the two racks at the seven-foot level to provide a second operating level for those units making use of the full height of the rack.

The framework consists of light H-beams and heavy angle iron and is anchored at the top to the roof trusses to give complete rigidity. The base of each unit is a concrete trough with a drain. Conventional services run the full length of the rack on each operating level. A separate grid of quarter-inch pipe is fastened to each side of each rack, thus providing four working surfaces, with the two grids on each rack one foot apart.

The units in operation on the racks range from standard laboratory glass equipment on up to steel vessels holding as much as five gallons. The heavier steel equipment is supported by specially made hangers which are generally welded to the framework, while the glass equipment is held by standard laboratory clamps.

General ventilation of the room is provided by an oversize exhaust blower and duct system. Spot ventilation at any point on the rack is provided by a flexible duct consisting of flame-proof impregnated duck over spiral steel wire. This duct can be brought to any point on the rack in a matter of minutes. Other features of the laboratory, such as benches, fume hoods, glass-blowing bench and the like are of standard types.

Safety showers are spotted at strategic points and sliding poles for escape are positioned so that no point on the rack or in the room is cut off from exit in case of fire.

In many research organizations the function of developing continuous units on a miniature scale is left to the laboratory originating the process. While many processes must be run in a continuous manner even on a laboratory scale, it is felt that, in general, developing continuous systems is a specialist's job and requires special techniques. As in any other field such increased specialization results in more efficient handling of problems.

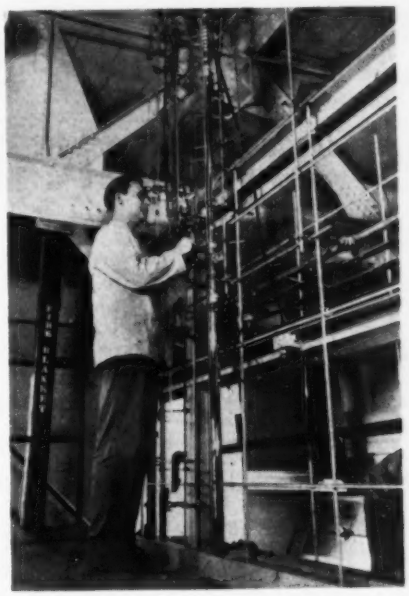
The new mini-plant furnishes the other research laboratories and the pilot plant with a convenient place for the preparation of materials in the inconvenient five-gallon quantity range. Organic preparations in that quantity range, particularly if low pressure distillations are involved, are very slowly produced in a laboratory, while the same quantity is likewise inconvenient to produce in a pilot plant with vessels of 100 gallon or larger size.

PERMITS RAPID CHANGES

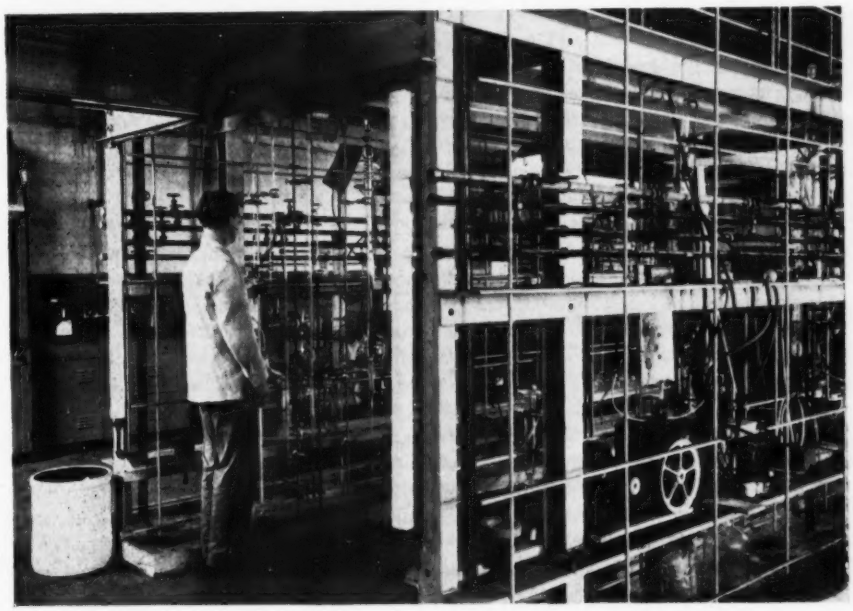
Often in the pilot planting of a new process difficulties are encountered that are slow and expensive of solution because of the time required to make a series of equipment changes in the effort to pin the trouble on a single variable. In such cases the process can be brought back to the mini-plant for a more rapid determination of correct technique.

Other information required for pilot plant design work that is not furnished by the originating laboratory will be developed by the new group. Such information includes vapor pressures and compositions for fractionation design purposes and the like. An important activity is the study of material of construction requirements. While great dependence is placed on published information and recommendations of suppliers, in the last analysis most material specifications must be checked by actual test. A library of test specimens of the most important metallic and nonmetallic materials of construction has been assembled for this purpose.

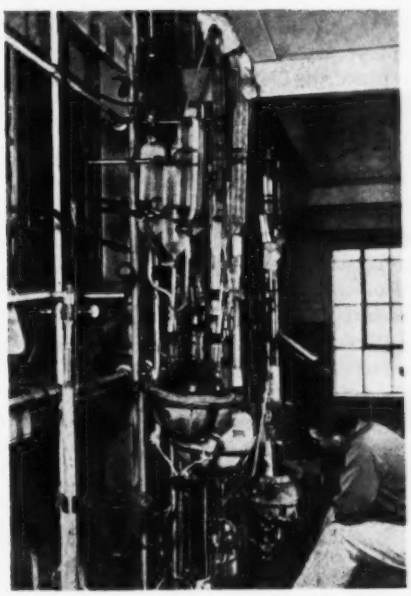
While the establishment of a mini-plant might seem to some an unnecessary stage in the progression of a process from the laboratory to pilot plant stage, we are convinced from the results already obtained that the savings made in the overall time required before commercial operation more than justifies the outlay of time and money.



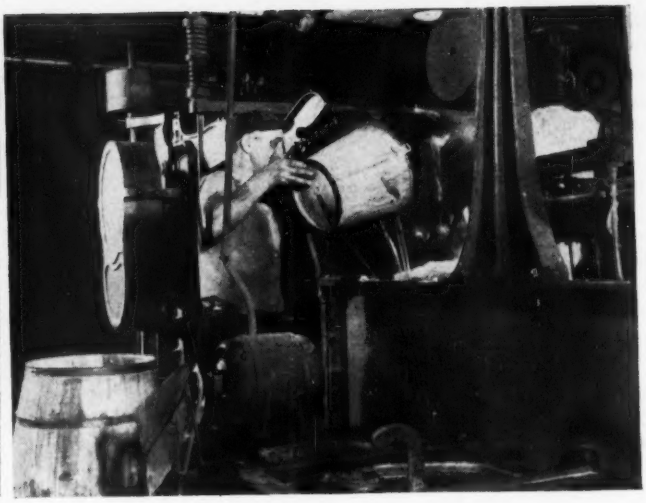
The "second story" of a glass unit for the study of a gas absorption problem.



This view shows the dual construction of the rack. There are two outside and two inside working faces, each 19 ft. high by 20 ft. long, with a cat walk at the seven-foot level.



Glass equipment for a continuous process study on the first floor level of the rack.



Synthetic detergents are employed in a gamut of uses—from milady's bath to the scouring of raw wool.

What's Ahead for SYNTHETIC DETERGENTS?

EDITORIAL STAFF REPORT

INCREASING ACCEPTANCE OF SYNTHETIC DETERGENTS by industrial users and housewives alike points to a wider market for these versatile materials. The current fats and oils shortage adds to their present popularity, but their place in a competitive market will be secured by their ability to do some—but not all—jobs better than soap.

UNITED STATES production of synthetic detergents in 1928 was zero pounds; by 1941 it was 100,000,000 pounds. A phenomenal industry had grown up in 15 years, and the end is not yet in sight. No figures have been released on 1945 production, but capacity has been estimated at something over 125,000,000 pounds, and production was very probably close to 100 per cent of capacity.

What production will be five, ten or twenty years hence is impossible to gauge, but manufacturers right now are planning to increase their capacity to an estimated 375,000,000 or more pounds.

Why this enormous increase? There is no simple answer to this question. Many factors are involved, and an examination of detergents in general may shed some light on the various elements which enter into the whole picture.

WHAT THEY ARE

Perhaps "surface-active agents" would have been a better term to use in the title than "synthetic detergents."

Surface-active agents constitute a large class of compounds. all of which are characterized by having a hydrophilic portion and a hydrophobic portion contained in the same molecule. They orient themselves at the interface of two dissimilar materials, such as oil and water, air and water or oil, or "dirt" and water or oil, lowering the interfacial or surface tension and giving rise to the phenomena commonly associated with surface activity, viz., detergency, wetting and penetration, emulsification and foaming, and dispersion. The four principal actions are (1) detergency, (2) wetting, (3) emulsification, and (4) dispersion. Penetration and foaming are aspects of wetting and emulsifying respectively, and other phenomena can be similarly related.

All surface-active compounds exhibit all of these properties to some degree, but any particular material is usually outstanding in one or two of them. Thus, a good wetting agent may be a poor detergent, or a good detergent may be a poor emulsifying agent. Some of the techniques used in the manufacture of synthetic materials are adaptable to the production of a whole range of compounds exhibiting various degrees of effectiveness in the four classifications of use.

It is imprudent to make generalizations relating the type of surface activity to chemical structure. In general, however, paraffin chain salts, such as soap and the sodium alkyl sulfates, are good detergents; paraffin chains with a water-soluble group near the center, like sulfonated castor oil and sodium dioctyl sulfosuccinate, are good wetting agents; quaternary ammonium salts are good dispersants; and the non-ionic compounds are good emulsifiers.

It is hoped that eventually enough data will have been assembled and correlated so that general rules may be formulated to enable prediction of surface activity. Then the researcher will be able to synthesize new compounds with some assurance that their emulsifying power for some particular oil, for example, can be predicted with a fair degree of accuracy. Or, conversely, if some particular emulsifying problem arises, he will be able to choose without recourse to experiment the few out of the hundreds available which will perform most efficiently. Until that time, it will be necessary to work more or less empirically, guided only by the vaguest generalizations.

TESTING

Dispersion, emulsification and wetting are properties which can be evaluated more or less reproducibly in the laboratory. Detergency, however, is a complex phenomenon which does not lend itself to simple testing. It undoubtedly depends upon the interrelationships of interfacial tension, contact angles of wetting, diffusion constants, solute and solvent properties, steric effects, dissociation constants, and probably others. While one can discern the possibilities of systematic approach, any kind of correlation is still in the empirical stage.

In the meantime the Launderometer is the only practical apparatus for testing.

Here a cloth sample, soiled with a definite amount of "standard soil" (a mixture of carbon black, lanolin, etc.), and a similar clean sample are tumbled with a definite quantity of detergent solution. Reflectance af white light of both samples is measured before and after washing. Detergency is calculated on the basis of the four reflectance values. These values are difficult to reproduce, and often practical results in the laundry are at variance with laboratory findings.

Returning for a moment to the other properties, it has been found that a good emulsifier for mineral oil, for example, may emulsify capryl alcohol poorly, and vice versa.

The conclusion is that at the present state of the art, surface-active agents cannot be evaluated for a certain property under certain defined circumstances unless it is tried out under those exact circumstances. They have been likened unto dyestuffs in that their properties are specific and unique and cannot be predicted beforehand except in very general terms.

SOAP

The oldest and most common surface-active agent, of course, is soap. Even the present 100,000,000-pound production of synthetic detergents is a mere 3 per cent of the 3,250,000,000 pounds of soap manufactured annually in this country. Even with the added capacity provided for in the present expansion plans, the best that the synthetics can attain at present is a ratio of 10:1 in favor of soap.

Why, we may ask, is soap's market threatened at all? The answer to that is that soap, like any other surface-active agent, is subject to limitations. It is an excellent detergent, but only in warm, soft alkaline water. There are few better detergents, but synthetics are proved superior for wetting, emulsifying, and dispersing. Moreover, its taste is not conducive to acceptance in toothpastes, food-stuffs, and the like; and in cosmetic preparations it is likely to prove irritating. Many industrial processes requiring a surface-active agent are more conveniently or efficiently carried out in the cold, or in acid solution, or in the presence of electrolytes. Under such conditions, soap is unsuitable. Also in hard water areas the use of soap is uneconomical unless the water is softened. Soap forms, with the calcium and magnesium salts present in hard water, greasy, insoluble curds. This is not only wasteful of soap but it is also responsible for "bathtub ring," cloudy and streaked glassware, and the generally dingy appearance of materials washed with soap in hard water. The synthetic detergents do not form these insoluble curds. An experiment recently reported[1] showed that an average family of five using water of 270 p. p. m. hardness used $48.42 worth more of soap per year (figured at 12 cents per pound) than when they used water of 80 p. p. m. hardness. The saving represents 68 per cent of the total soap cost when unsoftened water was used.

Then, we may ask, why will soap continue to be used? First, and foremost, soap is the cheapest good detergent. Actual experience bears out laboratory findings that soap cleans textiles better than comparably priced synthetics. Also, industrial processes of long standing were worked out with soap's limitations in mind. In order to take advantage of synthetic detergents, inertia will have to be overcome to introduce new techniques—even if they are inherently cheaper or more convenient.

The limitations of soap were realized early in the dye industry, and almost a hundred years ago the first synthetic detergent, sulfonated castor oil (Turkey Red Oil), was introduced. It is primarily a wetting agent and was found superior to soap in the dyeing of cloth with Turkey Red. It is still being used at the rate of about 30,000,000 pounds per year.

Soap and Turkey Red oil had the field to themselves until after the first World War, when alkylated naphthalene sulfonates were introduced in Germany. Work in this country, following the research lines laid down in Germany, resulted in the introduction here, in the late nineteen-twenties, of the sodium alkyl sulfates. Research and development have progressed from that time until the present, and now over 300 commercial items are available.

FATS AND OILS SITUATION

The recent war saw in Germany the use of synthetic detergents on an unprecedented scale. One type alone—the "Mersols," produced from by-products of the Fischer-Tropsch synthesis of hydrocarbons from coal—and similar to products obtained in this country by sulfochlorination—was produced at a rate of over 150,000,000 pounds per year. German housewives received rations of washing compounds containing these materials just as they received their food rations.

This was not, of course, a matter of choice. Germany suffered a severe shortage of fats and oils, lacking, therefore, the wherewithal to make enough soap.

The situation in this country is not comparable, even though we suffer a similar, though not so serious, fats and oils shortage. A large proportion of the synthetics themselves, such as the alkyl sulfates and acylamidoethyl sulfates and sulfonates, are based on natural oils, and the synthetics manufacturer is in the same position regarding raw material supplies as the soapmaker, although the former does not require as much fat per pound of product.

Some of the synthetics are based on petroleum and coal-tar derivatives and are consequently not subject to the same raw material limitations. Here, however, the question is one of plant capacity, and at the present time more urgent production programs have prevented the expansion of facilities as rapidly as the market would justify.

PRICE

As was mentioned before, soap enjoys the advantage of cheapness. The most popular synthetic detergents, in the household at least, are the sodium alkyl sulfates and the sulfated monoglycerides, both of which are inherently more costly than soap. It is doubtful that hydrogenolysis of oils followed by sulfation and neutralization, or partial hydrolysis followed by sulfation and neutralization, can ever be done as cheaply as the simple and simultaneous fat-splitting and soap formation afforded by the usual mode of soap manufacture.

Even more expensive are the ethylene oxide adducts to alkyl phenols and the sulfates and sulfonates derived from these.

The only types which appear to be competitive on a price basis with soap—and "price basis" is emphasized advisedly—are the synthetics derived from petroleum and coal tar. Among these are the alkyl aryl sulfonates; products derived from the sulfochlorination of paraffins followed by hydrolysis and neutralization; and products derived from treatment with sodium bisulfite of compounds formed by adding nitrosyl chloride to olefins. The price of one leading product has now been reduced to 13 cents per pound in industrial quantities, which is only a little higher than comparable soap prices.

Although some attention must certainly be paid to the comparative prices of soap and synthetics, the special properties of the latter which permit them to function admirably in situations where soaps are ineffective give them an importance and a consumer value out of all proportion to their cost. The limitations of soap, mentioned above, are very real and often very expensive.

Where it is convenient and practicable to use warm, soft water and an alkaline medium for washing, soap's tenure is not threatened by any other aspirant, whether it be cheaper or even comparable in price. Only one company, to our knowledge, claims to have a synthetic detergent under development which is superior to soap in the Launderometer test, and its price certainly precludes its use where the conditions for soap use are satisfactory. The market for synthetic detergents lies where optimum conditions for use of soap are impossible or inconvenient of attainment.

MARKET

One large market for synthetics immediately suggests itself: those areas where the water supply is so hard that the use of soap is uneconomical unless the water is previously treated. United States Geological Survey Paper No. 658, covering

[1] Hoover, *Water Works and Sewerage*, Reference & Data, April, 1946, 158.

public water supplies of the United States, shows that out of a population of 57 million in the towns and cities for which there are accurate data, only 20,372,000, or less than 37 per cent, have available for household use water that would be classified as soft, i.e., with hardness of less than 60 p.p.m. It might be argued that chemical treatment of the water with softeners or sequestering agents to render it suitable for soap is cheaper than the use of synthetic detergents with the raw water. This depends, of course, on the relative prices, but it still entails an extra, and possibly inconvenient, step.

It is pertinent in this regard that over a quarter of the families in Milwaukee and its environs, according to the *Milwaukee Journal* 1946 Consumer Analysis, purchase synthetic detergents for household use. How much of it is due to preference and how much is due to the difficulty of obtaining soap was not determined, but it was certainly no easier to find detergents than soap at the time (early this year) that the survey was made.

There still remains a large market in industrial processes which must be carried out in the cold or in acid or neutral media. Indeed, it was for such processes in the textile industry that synthetics were first developed. In that industry the synthetics are used in scouring, softening, and dyeing. Wool, especially, is sensitive to alkali, and rayon is deteriorated by high temperature. Dye pigments must be well dispersed and the fibers must be quickly and uniformly penetrated by dyeing or other treating solutions. All of these problems are simplified by the use of synthetics. Cation-active compounds, moreover, have been found to give a permanent softness to the fabric.

Among other applications for which manufacturers recommend synthetic detergents are glass washing, as in the dairy and brewing industries, metal cleaning and degreasing, and washing of vegetables.

As emulsifying agents, the synthetics find specific application in foodstuffs, such as mayonnaise, ice cream, and the like; cosmetics, such as cold creams, toothpastes, and hair tonics; resin, wax, and rubber emulsions; ore flotation and classification; resin emulsion polymerization; cutting and grinding oils; paper and textile processing; and in water-base paints.

Also as wetting agents do the synthetics find wide use. They are used, for example, in wettable DDT formulations; in air washing to remove dust; in fire-fighting to afford penetration; to prevent pitting in electroplating; in steel pickling; to prevent adhesion of air bubbles in photographic film developing; to improve spreading of oils and lacquers; in ceramic manufacture to lessen use of water; to facilitate solution of unwetted solids; and in a host of other uses.

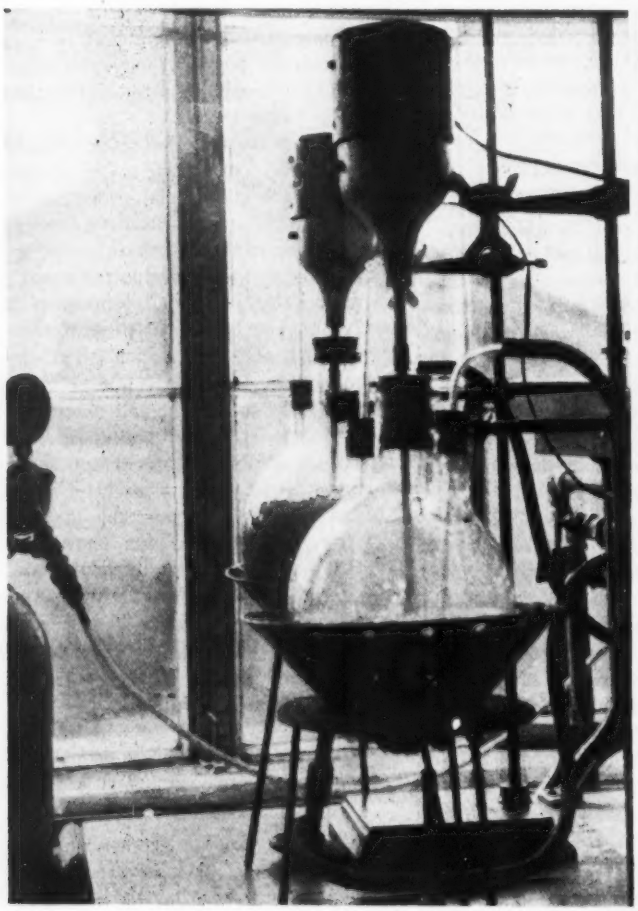
MANUFACTURERS' PREDICTIONS

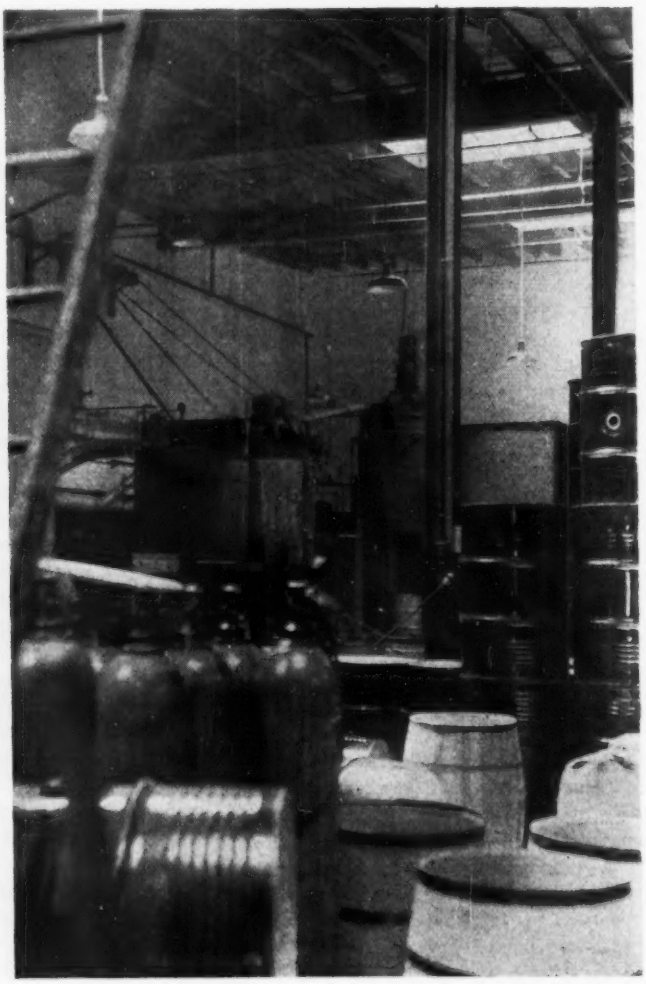
Many of the major concerns in the field were asked what the immediate and long-term prospects are for synthetic surface-active agents.

One manufacturer of very efficient but rather expensive detergents foresaw no reason why the synthetics should not eventually capture a major share of the soap market. He admitted that the better materials were higher priced, but at the same time he insisted that they were efficient at one-fifth the concentration of soap. Even if the price differential were five-fold, then, there would be no economic advantage in using soap. One material under development in his laboratories, he said, was more efficient than soap in Launderometer tests and was now undergoing practical field trials.

Another firm, which introduced last year a potentially cheap product based on sulfonation of paraffins, was unwilling to talk about it. Reticence was not due to a lack of confidence in its ultimate potentialities, but rather to the inability

(Turn to page 973)





(Courtesy Glyco Products Co.)

Laboratory and plant preparation of non-ionic detergents. Note the ethylene oxide tanks in both views.

Federal Power Commission and National Resources Planning Board

by RICHARD M. LAWRENCE* and LAWRENCE A. MONROE**

MUCH DATA ON THE American electrochemical industry can be found in the Federal Power Commission's numerous reports and surveys. National Resources Planning Board documents are a mine of background information for long range planning.

FEDERAL POWER COMMISSION

THE Federal Power Commission, with its heavy responsibilities in connection with electric power and natural gas, is in position to supply chemical market researchers with significant viewpoints and a vast array of data on these major fields of industry.

The Commission, whose Chairman is Mr. Leland Olds, has broad regulatory powers over the electric power and natural gas industries under the Federal Power Act, the Natural Gas Act and various other Congressional mandates. Under these acts the Commission is vested with jurisdiction over the interstate transmission and sale of electric energy. It also has control over water-power projects on Federal public lands and reservations and in the waters over which Congress has jurisdiction. The Federal Power Commission is also responsible for the making of investigations to develop possible utilization of the water resources in different sections of the country and to determine the location, capacity, and development cost of government dams and the market for power from such dams. Part of the engineering work involved in carrying out these functions involves the collecting and analyzing of information regarding the production, transmission and sale of electric energy, and the determination of its use in industry, commerce and the national defense. Of interest to industry are the engineering studies on the industrial use of electricity in manufacturing and mining operations. Those parts of the Federal Power Commission's engineering activities which are of particular interest to the chemical industry relate to studies of large power consuming establishments such as those using electrochemical and electrometallurgical processes.

In the natural gas field the Federal Power Commission has jurisdiction over the interstate transmission and sale of gas at wholesale for resale. To determine the necessity for such transmission the Commission is currently engaged in an extensive investigation of the size and location of the country's natural gas reserves as well as the production, consumption, end use, and conservation of gas.

As part of the Commission's work in preparing for war, it became deeply concerned with the planning of adequate power supplies for production centers. It made predictions of region power needs which required careful analysis of market requirements. Of great importance were the requirements of war-expanded major power-consuming industries including electrochemicals, such as aluminum, magnesium, zinc and others. Under the organization of the Commission, this work is handled in the Electrical Division of the Bureau of Power.

It is particularly helpful to the Commission to be advised well in advance of plans for potential changes in the magnitude of large industrial power consumptions. At the same time, many viewpoints of the Commission will obviously be helpful to chemical and other companies planning major increases or decreases in their use of power.

The staff of the Federal Power Commission includes a large number of electrical and civil engineers, accountants, lawyers, economists and statisticians. Regional offices are maintained at Atlanta, Chicago, Fort Worth, New York and San Francisco.

Leland Olds, chairman of FPC

PUBLICATIONS

The Commission's publications comprehensively cover the electric and gas industries with directories, maps, rate books, statistics of operations, financial records and special studies.

Directories S-9, S-19, and S-23 present detailed information on Electric Generating Plants, Electric Utilities, and Gas Utilities. Accompanying wall maps show plants, transmission, and pipe lines.

The National Electric Rate Book lists the standard rates charged by all publicly and privately owned utilities in every community of 1,000 or more population. Issued in loose-leaf binders, which are kept up-to-date with supplementary data sheets, this service is available for the United States as a whole or for individual states.

Electric Power Statistics is a loose-leaf service comprising 48 monthly, 3 annual, and occasional supplementary reports. It includes reports summarizing power

* Development Department, Atlas Powder Co., Wilmington, Del.
** Ethyl Corporation, New York, N. Y.

Some Federal Power Commission publications.

requirements and supply, production of electric energy and capacity of generating plants, consumption of coal, oil, and gas in the production of electric energy, sales, revenues, and income of privately-owned electric utilities, also various supplements on subjects related to the electric power industry, and certain annual publications. *"Electric Power Statistics, 1920-1940"* presents a complete series on production, capacity, and fuel consumption, *Industrial Electric Power in the United States, 1939-1945* presents data for generation and use of electric energy by major industry groups. *Electric Power Requirements and Supply in the United States, 1940-1945* presents statistics showing the war impact on the electric utility industry and an appendix shows scheduled increases in capacity 1945 and 1946. *Statistics of Electric Utilities* contains data on stocks, bonds, revenues, expenses, sales, utility plants, income, earned surplus, balance sheets and physical quantities for privately owned companies.

In 1938 the Commission published an important special study *"Power Requirements in Electrochemical, Electrometallurgical and Allied Industries,"* prepared by J. V. Alfriend, Jr., S. H. Thompson, and W. B. Moore of the Electrical Division. This survey covered the principal industries using electric power primarily for electrolysis and for heat.

The electrolytic group included aluminum, copper, zinc, magnesium, cadmium, and other metals, chlorine, caustic soda, and hydrogen peroxide. The electrothermal group included those industries in which electric furnaces find widespread use, as in the melting, refining, alloying, and heat-treating of iron and steel, brass, and ferro-alloys, the manufacture of abrasives, refractories, calcium carbide, carbon products, and phosphoric acid. Chemical nitrogen, potash, and inorganic fertilizers were included because of their close relationship to electrochemical processes and their large consumption of power.

The report discusses products and processes, uses, and market conditions with particular reference to current and future power requirements and supplies. Data were presented, for 10 to 30-year periods, on capacity, output, foreign trade, and consumption. Numerous maps, charts, and photographs are included. This report is now out of print but is available in most technical libraries.

As the Commission's studies during the War years have brought into its files a vast amount of new information on the electrochemical and electrometallurgical industries, chemical market researchers hope that a revised edition of this important survey will be issued.

SELECTED CHECK LIST OF PUBLICATIONS

Publications should be ordered direct from the Federal Power Commission, Washington 25, D. C., with checks made payable to the Treasurer of the United States.

General

Annual Reports
(Outline of policies and operations —Due to war restrictions the last report published was for the year 1940) $0.20

List of Forms and Publications (free)

Rate Series

(a) National Electric Rate Book in loose-leaf binder, and Supplement Service for 12 months 10.00

(b) Supplement service thereafter, per year 7.50

State Rate Books (a) $1.00 and (b) $1.00.

(Note: These Books cover standard rates and not special industrial power contracts.)

Statistical Series

S-9 Directory of Electric Generating Plants (1941) 1.00
Includes map (27" x 42") of generating plants and transmission lines, 1941.

S-17 Electric Power Statistics
Loose-leaf statistical service in binder, with tabbed separators, comprising 48 monthly, 3 annual, and occasional supplementary reports (S-20, S-42, and S-43) per year 2.00

S-19 Directory of Electric Utilities in United States (1941) 2.00

S-20 Electric Power Statistics, 1920-40 .25

S-23 Directory of Gas Utilities in the U. S. (1942) 2.00

S-39 Industrial Electric Power in the U. S., 1939-1945 ..... .50

S-40 Electric Power Requirements and Supply in the U. S., 1940-1945 (War Impact on Electric Utility Industry) 1.00

S-41 Statistics of Electric Utilities (1944) 2.00

S-41A The Financial Record of the Electric Utility Industry 1937-1944 Free

S-42 Consumption of Fuel for Production of Electric Energy (1944) .10

S-43 Production of Electric Energy Capacity of Generating Plants (1944) ..... .25

S-44 Statistics of Natural Gas Companies (1944) 1.00

S-45 Preliminary 1945 Report—Electric Production, Generating Capacity and Fuel Consumption of Electric Utilities in the United States ..... .05

Map Series

M-3 Electric Utility Generating Plants and Transmission Lines in the United States, with accompanying directory (1941), 4½' x 7' 2.50

... Principal Electric Utility Generating Stations and Transmission Lines with accompanying plant and ownership list (1945) — Regional; 17 sheets cover the United States (Set) 6.25

... Zone Maps—Generating Plants and Transmission Lines (formerly U. S. Corps of Engineers "Electric Power Survey") (1945)—85 sheets, 13" x 21", cover the United States.[1] ....

M-4 Principal Natural Gas Pipe Lines in the U. S. and Communities Served with Natural, Manufactured and Mixed Gas (1943) 53" x 40" 5.00

... Natural Gas Pipelines — Communities Served with Natural, Manufactured, and Mixed Gas —by States (1945) 19" x 26"[1] ....

[1] The Commission has only a very limited quantity of these maps and they are, therefore, not available for general distribution.

POWER MARKET SURVEYS

In addition, and of particular interest, the Commission's Bureau of Power prepares, on the basis of research by its regional offices, power market surveys required for the planning of Federal multipurpose hydroelectric projects. A large portion of the nation has now been covered by these reports which can be consulted in the office of the Commission's Bureau of Power, 1757 K Street, N. W., Washington. From time to time mimeographed copies may be available for limited distribution. A list of completed reports follows:

Upper Illinois River Basin Power Study (Illinois, Des Plaines, Kankakee, and Fox Rivers) 1945
Power Market Survey — Gavins Point-Fort Randall Project (Missouri River near Yankton, South Dakota) 1943
Power Market Survey—Lahontan Basin (Nevada, California) 1945
Arizona Power Survey—1942
Power Market Survey—Multiple-Purpose Projects in Rio Grande Basin (New Mexico) 1944
Power Market for the Output of the Clark Hill Project (Savannah River, Georgia, South Carolina) 1937
Central Valley Project Studies (California) 1944
Power Market Survey—Missouri River Diversion Project (North Dakota) 1943
Power Market Survey—Yellowstone River Basin—1939
Northwest Region (Washington, Oregon, Idaho, Montana) 1940

Staff Report on Potomac River Basin Power Market Survey August, 1944
Report to Congress on the Passamaquoddy Tidal Project (Maine) 1941
The following reports are in process of preparation:
Southeastern Region Power Market Survey (Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, and Kentucky)
Colorado River Basin Power Market Survey
Missouri River Basin Power Market Survey
Power Market Survey of Vermont, New Hampshire, Massachusetts, Connectricut and Rhode Island
Power Requirements Survey—State of Utah
Power Requirements Survey—State of Vermont
Power Requirements Survey—State of Texas
Power Requirements Survey—Rio Grande Basin (Colorado, New Mexico and Texas)
Coordination and Utilization Study for Texas and Oklahoma

NATIONAL RESOURCES PLANNING BOARD

THIS Board and predecessor agencies, which operated from 1933 to 1943, had the primary function of advising the President on long-range planning. A major activity was the clearance of information, ideas, and projects within federal agencies and the various levels of federal, state, and local government.

The studies and recommendations of the Planning Board covered a broad range of national problems, including the field of public works, power, transportation, land and water use, housing, population, technology, research as a national resource, and a sweeping plan (1943) for national resources. In all 70 major reports and several hundred minor ones were published.

Certain of the Planning Board's publications are of considerable interest as background information or for the long-range aspects of market research. Deserving of special mention is "Industrial Location and National Resources" (360 pages, 1942), which comprises five principal parts:

(1) Relation between basic resources and the locational pattern of industry;

(2) Growth of our manufacturing industries and recent shifts in their geographic distribution;

(3) Analysis of chief production and distribution factors involved in locational decisions (raw materials, power, fuels, water supply, transportation, labor, markets, capital, and managements);

(4) Organizational factors, such as size of plant, company, and city, and degree of integration of plant and company, with attention also given to governmental and community influences in the location of industry;

(5) Over-all review af methods and selection of plant locations.

Also of considerable interest to market researchers are the three history-making reports "Research — A National Resource", (particularly Vol. 3):

1. Relations of the Federal Government to Research.
2. Industrial Research.
3. Business Research.

The significant and comprehensive survey, "Technological Trends and National Policy" (1937) was a major attempt to show the kinds of new inventions which may affect living and working conditions during the next 10 to 25 years. It included a section on the chemical industries by the late Harrison E. Howe, which pointed out important trends and tendencies.

The complete list of National Resources Planning Board Publications appears in Bulletin BB14 (1944) of the American Society of Planning Officials (1313 East 60th St., Chicago 37, Ill.). Another list is the Superintendent of Documents' "Price List 20 'the Public Domain'" indicating which reports are still in stock.

SELECTED CHECK LIST OF PUBLICATIONS

(Order from Supt. of Documents, Washington 25, D. C.)

Mineral Reserves of the U. S. and Capacity for Production (1937)	
Technological Trends and National Policy (1937)	$1.00
Technology and Planning (digest of above)	.10
Patterns of Resource Use (1938)	.35
Capital requirements of the Iron and Steel Industry (1940)	.20
Energy Resources and National Policy (1939)	1.00
Our Energy Resources (digest of above)	.10
Industrial Development:	
Middle Atlantic Region (1942)	.15
Mountain States Region (1942)	.20
Pacific Northwest Region (1942)	.15
Industrial Location and National Resources (1942)	1.50
Research—A National Resource	
Vol. 1 Relation of the Federal Gov't to Research (1938)	.50
Vol. 2 Industrial Research (1941)	1.00
Vol. 3 Business Research (Out of Print)	
Development of Resources and of Economic Opportunity in the Pacific Northwest.	
National Roster of Scientific and Specialized Personnel (1942)	.10

Five Points to Consider in Setting Up A Chemical Market Research Department

FORMALIZED market research is relatively new in the chemical industry, but in the competitive days ahead more and more use will be made of this type of exploration.

The following five factors to be considered by a chemical firm contemplating setting up a market research department were enumerated in a paper presented before the Chemical Market Research Association in Detroit, April 25, by Lawrence C. Lockley, manager of the Market Research Division, E. I. du Pont de Nemours & Co.:

1. Is management sufficiently convinced of the value of market research, and sufficiently experienced in its use to make it a valuable addition to overhead expense? Many top executives in this industry are men who have come up to the top through the production side, and a great many are chemists by professional training. Unless such men are sufficiently experienced, they are not likely to be able to make adequate use of this new tool.

2. What types of skills are most important to market research in the chemical industry? Probably the prevailing practice is to attempt to make market research men out of research chemists. Yet a wide knowledge of marketing methods, a knowledge of economic conditions and trends, a knowledge of questionnaire building, sampling techniques and statistical techniques, are necessary to a well-rounded market research man.

3. How can market research be financed or budgeted? C. F. Kettering has said that it is impossible to budget research work. But budgets of some kind are necessary. One practice is to maintain market research by charging the cost of specific research jobs against the selling cost of the product benefiting by the work. Yet this practice has the tendency of limiting requests for market research till some emergency arises. Where company organization permits, it seems likely that market research will be more regularly used, and become more integrally a part of sales planning, if it is carried as an administrative expense.

4. Should the individual market research department be developed to the point where it is self-sufficient, or should outside research firms be used? For a firm with a small or compact line of products which sell to a reasonably definite market, it is likely that a small market research group will be adequate, and will allow the great convenience of confining operation within the company. But a firm which sells a good many different products, or which sells to a wide and diverse market, is likely to have an irregular flow of market research work to be done. If the market research group is staffed for peak loads, it will be overstaffed part of the time.

5. Where should administrative responsibility for market research be fixed? Because much of the work done by market research groups should influence the formulation of company policy, it is probably best to have some executive at the policy-making level responsible for the supervision of its work. Another factor should be considered. Frequently, a market analyst must appraise the efficiency of marketing or advertising activity. Requiring a market research director to report to the man whose work he must, from time to time, audit, is not always good. Thus, the higher in the company's executive family market research can be attached, the broader and more impartial its work is likely to be.

Proper Chemical Plant Design Is Aid to Sanitation

by MOHE H. SOLWORTH, Sanitation Consultant,
Jos. E. Seagram & Sons, Inc., and Calvert Distilling Co.,
Louisville, Ky.

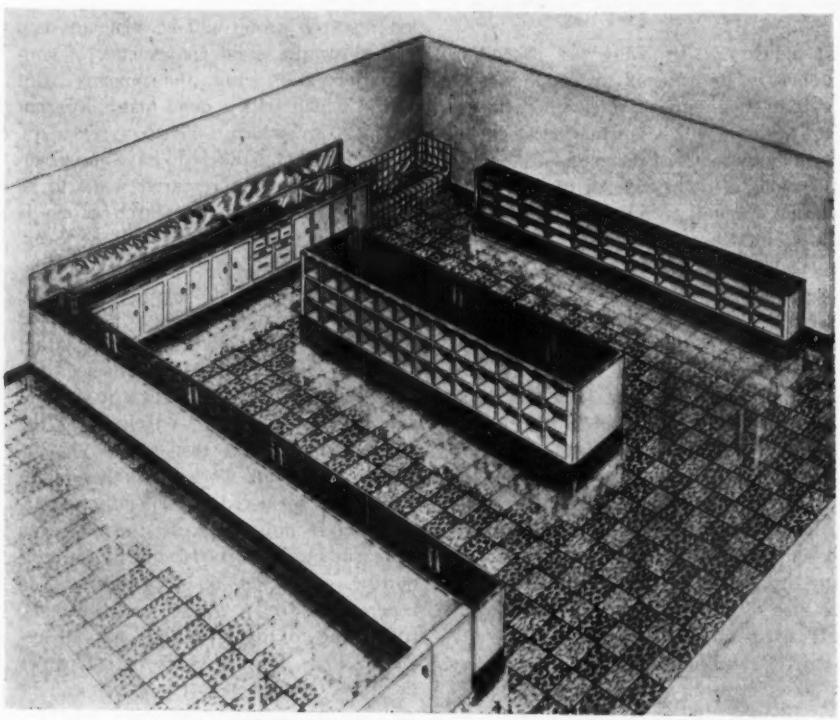
(Illustrations Courtesy Industrial Sanitation Research Foundation)

MANY NEW PLANTS AND LABORATORIES are now on the drafting boards. The moment they are put in use, the struggle to keep them neat and clean will begin. How easy and how successful that struggle is will depend upon how wisely the building was designed—upon how well the designer recognized the concept of preventive sanitation.

ALTHOUGH American industry likes to think of itself as progressive and well out in the forefront of technological improvement, industrial sanitation in this country has not kept pace with other industrial developments. In a country where the general public evinces more interest in cleanliness than is shown in the rest ot the world; where our levels of sanitation are higher than in those areas where mechanization has not progressed so far; where our public health system offers excellent health protection to the public at large; it is evident that most private industry has neglected its sanitation responsibilities. Although we have relatively high health and sanitation standards for community living, industry lags behind. In a recent survey made of some of the country's most progressive plants, very low standards of cleanliness were uncovered.

However, management is gradually becoming aware of the importance of sanitation—its importance in the increased efficiency of production, in the reduction of costs on all fronts, and in the maintenance of employee morale at a high level. During the years of the war, while greater numbers of women were employed and while labor was held to a more or less fixed wage, labor leaders were quick to seize upon the improvement of sanitary conditions within the working environment to compensate for the absence of wage increases. It now appears that the desire for higher sanitation levels within all plants is here to stay. If modern management wishes to exploit this interest in sanitation, the place to start is with architecture.

The modern concept of controlled industrial sanitation visualizes a continuous control of the industrial environment insofar as the elements of sanitation are concerned; its range extends throughout the entire industrial plant, penetrating all divisions and departments, and serving all types and kinds of industry. The achievement of that objective results in the facilitation of industrial production, the reduction of industrial costs, the promotion of health and safety, the development of esthetic values. and the building of better community and public relationships.

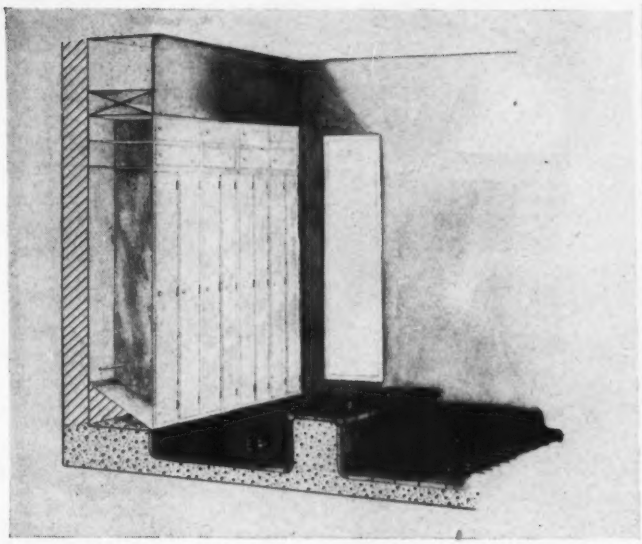


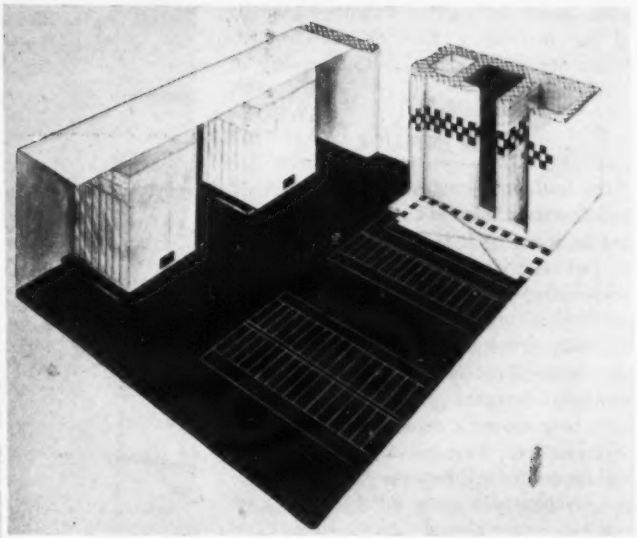
A modern sanitation supply room contributes to good order and efficiency.

PREVENTIVE VS. CORRECTIVE

After considerable experience in dealing with large-scale sanitation problems, we have observed that this type of industrial sanitation can best be achieved through the proper balance of two methods of attack—prevention, and correction. Preventive sanitation implies that measures be taken in advance to thwart dirt and disorder before they have accumulated and disrupted the industrial process, while corrective sanitation attempts to cope with the problem of removing dirt as it accumulates. The latter is a continuous process, a never-ending and thankless task; for without some form of control, dirt accumulates almost faster than human effort can remove it. Therefore, corrective methods, even though they now dominate most advanced sanitation programs, must rapidly give way to preventive measures which remove the ultimate causes for industrial insanitation.

Although the all-over control of industrial sanitation depends on integrating the work of many specialists from air-conditioning engineers to industrial psychologists, the architects hold the key to one large area of preventive sanitation.





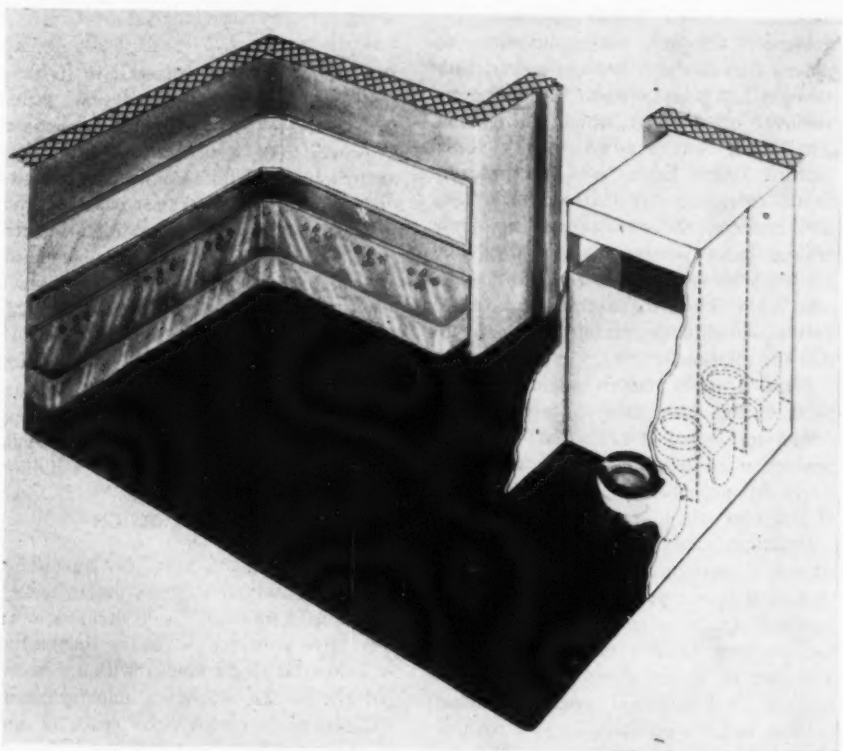
At left, diagrammatic view of built-in and ventilated lockers. Note cove base and floor bench. Sketch at right shows complete layout—with emphasis on cleanliness and ventilation. The same principles apply to production areas.

Theirs is the task of designing buildings which exclude dirt effectively and which are conducive to easy removal of any dirt which does enter.

THE EXTERIOR

Preventive sanitation must begin with the plant exterior. The increasing emphasis among progressive industries on the landscaping of yards and grounds should facilitate the elimination of industrial dirt and the simplification of the problem of sanitation. The greater the number of plants maintaining high exterior standards in each community, the easier it is for each one to improve its own levels; and the higher go the standards of the community as a unit. Industry sets the pace for the citizenry as a whole, and by simple precept can change the face of entire cities for better or for worse—too often the latter.

Lack of interest in such a simple expedient as landscaping can seriously impair the smooth functioning of the entire sanitation program within a plant. In one progressive industrial plant recently observed, the sanitation problems were seriously complicated by the lack of attention to this simple detail. There were no lawns; not even any grass grew in the neighborhood of this plant. The dry summer wind picked up large swirls of the sandy, yellow-red dust which blanketed the area, carrying it throughout the plant and depositing on everything in factory and office alike a fine coating of gritty silt. Its presence in the offices were merely annoying, but in the plant fine machinery was constantly exposed to its abrasive effects. The proper use of sod, or even of some rapidly-growing deep-rooted grass such as rye or alfalfa, would have quickly reduced this dust-hazard or eliminated it altogether. For a very small investment, a costly problem could have been eliminated almost entirely.



These modern waterclosets and sink illustrate the off-the-floor principle in modern design.

All too often the architect's responsibility for the completion of this phase of construction remains on the drafting-board and the landscaping falls to someone else, or is never completed at all. Too frequently the assumption seems to be made that a factory is a factory, and that it can exist as well in Ohio, Honduras, or Timbuctoo—or, for that matter, in a vacuum. The architect often sees his work only on paper. Hence, climatic factors, insofar as they influence both architecture and sanitation, receive insufficient consideration. Problems of heat, cold, and moisture as they affect the external shell are not always regarded as important. Frequently the geographic location is not figured into the equation. Sand, dust, moisture, or other factors which intimately but invisibly affect production and are dependent upon geographical variations often crop up as problems—after the building has been designed and erected.

The type of greenery best adapted to blanketing natural sources of industrial dirt in each climate must be studied with a view to the proper trees or grasses in landscaping. Instead, the architect sometimes sketches in a bluegrass lawn and flanks his building with conventionalized evergreens regardless of where it is to be built. This failure to eliminate or control outside dirt affects the sanitation level of machines, men, and production, and increases the work of the sanitation

staff inside to a great extent—especially if the machinery used or the products made are at all sensitive to humidity or air-borne dirt.

THE INTERIOR

In building design the trend toward functional architecture is already obvious, but in industry it is not moving forward as fast as is desirable. However, a few progressive industries have experimented with types of architecture which depart radically from the established industrial structure. Even in some of these experimentally designed plants the architects have been too little aware of the problems of sanitation. One plant which has been highly publicized because of its distinctive architecture gave good evidence of this fact at the time we inspected it. The design, which set high esthetic and utilitarian standards, eliminated some of the problems of sanitation—and at the same time raised others equally difficult. For instance, although air-conditioning removed part of the dirt at its source, little thought had been given to facilitating the removal of the dirt which did get in. The inside was finished with a light-colored rough brick, with the mortar-joints recessed; this material picked up and retained dirt which was not only tedious but expensive to remove by any known process of cleaning. The mistake was made when the architects assumed that air-conditioning would eliminate all dirt for all time.

Here I would like to discuss two aspects of the relationship of architectural design to controlled sanitation: first, the projection of buildings which are relatively dirt-proof, and second, the planning of buildings which are easy to keep clean.

Buildings cannot be kept clean unless they are constructed to be clean. Although it is not yet possible to design a building which is completely dirt-proof, the entrance of dirt can be controlled. The use of sealed doors and windows, filtered air-distribution systems, radiant heating, and the maintenance of a positive air pressure, however slight, within the building will prevent the entrance of much dirt from the outside, except for that carried in by employees. The introduction of radiant heat and solar radiation in place of the present convection types of heating will eventually eliminate much of the dirt which almost of necessity accompanies the present dirty heating systems.

MATERIALS OF CONSTRUCTION

The materials from which a building is constructed also contribute to the problems of sanitary maintenance, for most materials now used deteriorate in time, throwing off a certain amount of dust in the process. This fact is often overlooked by the architect or builder, who is primarily interested in the appearance of the building and visualizes it in its pristine state just after completion, rather than in the midst of industrial operations. However, new structural materials such as structural glass, ceramic tile, asbestos products, etc., which are for practical purposes almost devoid of these deteriorative characteristics, will make possible buildings with clean, pleasing exteriors which can be maintained at a satisfactory sanitation level with a minimum of expenditure of time and labor. The provision of easy access to large exterior surfaces for the execution of mechanized cleaning will assure protection of the esthetic values during the entire life of the building.

Built-in stainless steel towel dispenser and waste receptacle add to washroom neatness.

FUNCTIONAL DESIGN

Within the plant, what can functional design contribute to sanitary maintenance? The importance of its contribution to preventive sanitation is readily recognized by industrial sanitationists who are faced with the burden of keeping industry clean.

Large unobstructed floor space is one of the ear-marks of functional design. The feeling of spaciousness which one experiences upon entering a thoroughly modern plant is a great contrast to the impression given by the cramped, crowded working areas that still exist in too many of the industrial plants operating today. Increased floor space is achieved in part, perhaps, by actual increase in size; but also a major factor is the elimination of columns and trusses which are always dirt-catchers and which complicate the problem of sanitary maintenance. An additional factor is the more orderly arrangement of plant machinery. Wide spacious aisleways make cleaning much easier and more effective in addition to facilitating production and cutting down the danger of accidents to the employee. The advanced structural principles necessary to the reduction or elimination of trusses and columns are now known but are not yet very widely applied to industrial architecture.

Along with the elimination of numerous upright supports will come the concealment of overhead fixtures which will be replaced by recessed facilities of all kinds, especially wall and ceiling lights. Where it is impossible completely to eliminate overhead pipes in working areas, they can be installed with wide-angle bends to facilitate internal cleaning. Through modern design, dirt-catching corners can be eliminated by the wider application of such features as coved bases and ceilings along with streamlined construction which provides for flush surfaces—surfaces free from ornamentation and hence easy to keep clean. If architectural embellishment is desired, this ornamentation can be achieved through the use of flush stone or ceramic bands and glass block. The elimination wherever possible of horizontal surfaces such as copings, door and window frames and ornamental moldings, not only facilitates sanitary maintenance, but creates an esthetic effect in keeping with the temper of the times.

Walls of glass block are becoming more and more common, along with the greater use of air conditioning. With this combination, the whole wall acts as a huge window to transmit light for the working areas and has the great advantage of easy cleaning. Such walls can simply be hosed down with soft water and left to dry. Controlled ventilation with regulated humidity and temperature, when combined with walls of this type, can reduce corrective sanitation to a very low point. Metal fittings can also be made of nontarnishing metal which will require little time and effort to keep them shining.

EMPLOYEE FACILITIES

These items, important enough in pro-

duction areas, are doubly significant in such personnel facilities as cafeterias, locker-rooms, and lavatories, where new materials coupled with functional design are very effective. For instance, such features as off-the-floor sanitary fixtures, supplemented by controlled temperature of water in the toilet facilities to eliminate condensation, make washroom sanitation easy as well as economical. Similar advanced design can make lavatories and locker-rooms positive forces for developing sanitation-conscious personnel—and these in turn are a prime asset to the industrialist who wants to maintain high sanitation levels in production and other areas. While all this is of importance in establishing an efficient sanitation program, it holds additional significance when we reflect that some of the leaders in industrial architecture indicate that the coming trend will stress, not radical changes in engineering design, but structural refinements connected with improved employee and community relations.

BUGS AND RATS

Much industrial dirt is the result of infestation with insects and rodents. Tight construction throughout buildings makes the entrance of these pests difficult; the advanced design of such areas as kitchens, dining rooms, supply rooms, etc., will not only provide for keeping these areas scrupulously clean, but also will go a long way toward eliminating rodents and insects completely. For instance, well-screened dockrooms equipped with flush draining systems for the receiving and uncrating of food supplies and other edible materials reduce the prevalence of pests which enter the building with such shipments.

The storage of foodstuffs or edible chemicals always presents a difficult problem in pest control. However, storage rooms of impervious construction, equipped with welded-rod racks and shelves which have no shielded edges or recesses to provide insect runways or breeding places, are of great assistance. Storage rooms, in addition, must provide arrangements for speedy and safe fumigation of supplies if necessary.

FOR THE JANITOR

While preventive design holds the key to controlled industrial sanitation, industrial sanitationists recognize the fact that it is as yet impossible to construct plants which are completely dirt-proof. Therefore, facilities for removing the dirt which does accumulate must, for some time to come, be an integral part of plant design. Too frequently buildings are constructed with little provision for such simple necessities as water-change facilities. This means countless trips to the central tap, wasted man-hours on the part of the janitor, or—what is more likely—he just does not bother to change the water. Through the facilities of the Industrial Sanitation Research Foundation, a compact sanitation field station or water-change unit has been designed which can be incorporated into the design of new buildings or which can be produced in portable form for use in those buildings which need such provision.

Industrial design likewise fails to provide central sanitation stock and dispensing rooms. While the architect new recognizes the necessity for well planned and located stock-rooms for industrial materials and equipment, he has not seen the advantage of this principle applied to sanitation. Often no space whatsoever is provided for brooms, mops, ladders, and other sanitation supplies, which therefore decorate accessible corners, hallways and other spaces where they contribute heavily to the general disorder of working areas. Pictured here is one of these rooms which have recently been designed for installation *after the building was built.*

Although we do not as yet have adequate statistics on the man-hours saved by these simple devices, we do realize that the saving is significant.

IN CONCLUSION

A smoothly functioning sanitation program for industry, then, must have the cooperation of the architect, who can contribute significantly to "building-out" the dirt that is one of industry's great problems. While it is true that architecture, by its very nature, will be the slowest of all the elements in controlled industrial sanitation to develop, we have increasing need for the ideas and the attention of the architect in developing the preventive aspects of our work. Without the cooperation of this professional, we in industrial sanitation can only limp along on the crutch of corrective sanitation which we now know is outmoded and only partially effective.

Synthetic Detergents

(Continued from page 966)

to supply the present demand. There is no point in engendering inquiries, a spokesman asserted, until the company is in a position to supply the material generally. A large expansion of plant capacity is contemplated. In spite of the fact that this firm's product is potentially as cheap as soap, this spokesman did not foresee a general swing from soap to synthetics. He thought that the synthetics would replace soap only in special uses and under special conditions where soap suffers handicaps. It is pertinent, however, that all companies making petroleum or coal tar-based products are planning increases of 75 to 2700 per cent in plant capacity.

A more tempered view, probably, was obtained from a company manufacturing both soap and synthetics and who might be expected to take a more objective view. Their spokesman averred that soap was a generally better detergent, but that synthetics would find increasing use in washing glassware and dishes, woolens, colored fabrics, upholstery and rugs, and in shampoo and bath preparations. Industrial users would pay more attention to cost and would continue to use soap where there is no pronounced reason to change.

SUMMARY

These remarks tend to lead to the conclusion that the use of synthetics in proportion to soap will certainly increase, but that soap tonnage will continue to outweigh the synthetics as far as we can see into the future. There are many applications—and large ones, tonnage-wise—where synthetics can do a better and more convenient, if not a cheaper, job—especially in the hard-water areas of the country. It is not foolhardy to imagine a potential tonnage five times the present production.

Meanwhile, research will uncover more of the fundamental science of surface activity. The complex factors entering into detergent action will, we hope, become capable of analysis. It is not to be expected that the number of various compounds used will decrease. Rather we can expect more and more surface-active compounds, each tailor-made for a specific use.

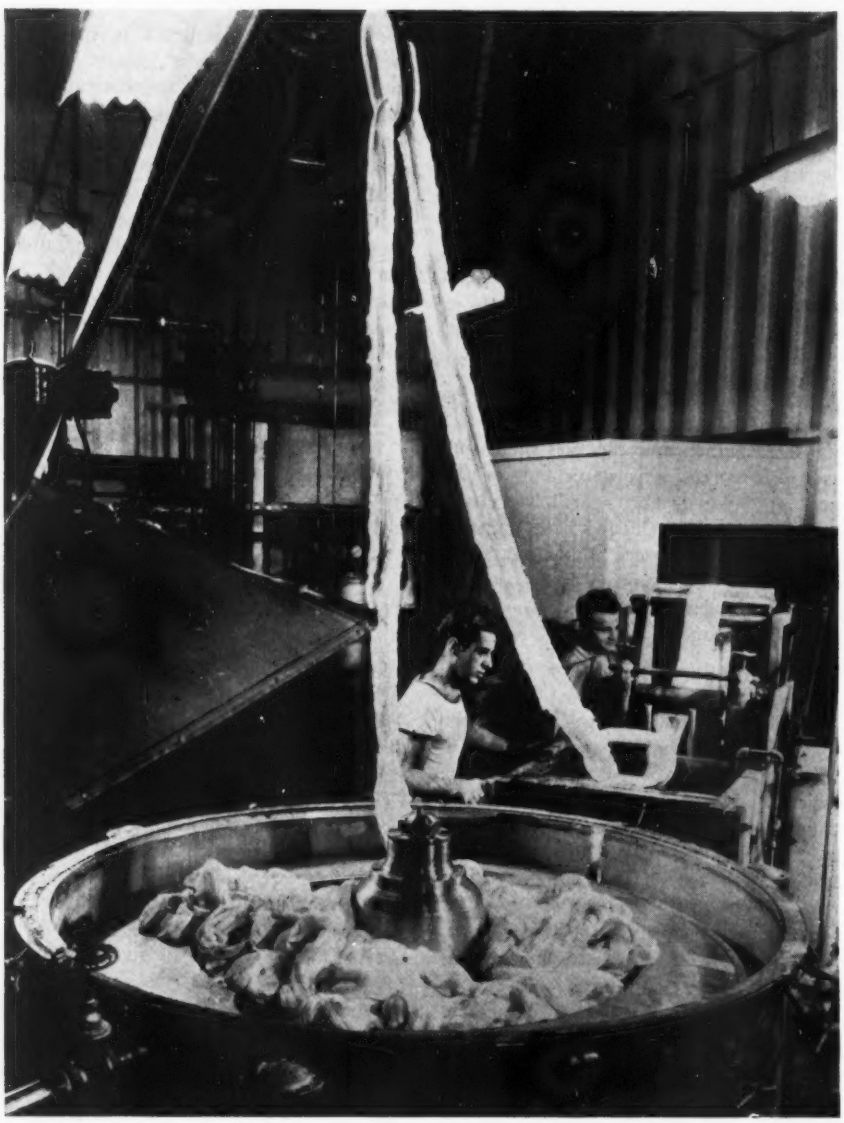
A comparison was made above with the dyestuffs industry. The large amount of research effort expended on dyes has not decreased the number to a few standard items. On the other hand, new dyes have been developed for new fabrics, new colors, new modes of applications. It is not unreasonable to suppose that the detergent industry will follow the same course.

The synthetics are peculiarly suited to fit such a scheme. The methods by which they are made (e. g., the addition of ethylene oxide to a phenol or alcohol) are capable of control to give a continuous variation of properties. The manufacturer will in all probability be able, some time in the future, to sit down and work out a practical compound with predictable properties for any problem requiring a surface-active agent which may arise. He will no longer have to depend upon what Nature has given him.

PROTEINS
As Industrial Raw Materials

by A. K. SMITH
Oil and Protein Division, Northern Regional Research Laboratory*
Peoria, Illinois

PROTEINS, WITH THEIR COMPLICATED CHEMISTRY, have been slow to develop into industrial usefulness. But the past decade has shown accelerated progress. The protein supply picture has changed from one of scarcity to one of plenty. Uses have expanded from the time-honored glues, gelatines, and paper coatings, into such promising fields as plastics, synthetic fibers, paints, and even fire extinguishers and insecticides.



Aralac, Inc.

Synthetic fiber from milk casein is one of the newer industrial uses of proteins. Production was started in this country about 1938 and is now at a rate of a million lbs. per month.

THE PROTEINS, as industrial raw materials, are slowly but surely reaching out for larger and more diversified markets. Research and industry have discovered or devised new processing methods, produced new products, and extended applications. Sources of protein have expanded. Problems created by the need for new materials and by changing methods of fabrication have opened up new possibilities. As a result, although the chief uses of proteins are still in the very broad field of gluing†, they are successfully invading other fields. Increased industrial utilization is greatly enhancing their importance.

Historically, the use of industrial proteins is quite old. Animal glues have been in use since the early Egyptian civilization. Yet the supply of such glues was limited until recent times. This situation was changed, however, about 60 years ago, when adequate refrigeration and transportation facilities gave rise to our organized meat-packing industry, with a consequent increase in animal wastes available for processing. It is interesting to note that the vegetable proteins derived from farm crops did not make their appearance until after World War I—the isolated soybean protein coming on the market in 1933 and the corn protein, zein, in 1938.

In comparison with general industrial development, it is evident that the proteins have advanced quite slowly. Two very good reasons account for this: first, the great importance of proteins as foods has limited the available supply for industrial uses to wastes, residues, and leftovers of the meat-packing, tanning, fishing, and dairy industries; and second, the very complicated chemistry of proteins has been slow to develop in the direction of industrial usefulness.

The basic problem of protein supply has now changed from one of scarcity to one of plenty. The scientific development of agriculture, increased efficiency of crop production through mechanization

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† Paper coating is included in gluing, since a main function of the protein is to adhere the inert pigments to the paper.

in farming, and the introduction into this country of the soybean have been mainly responsible for this change, and there is no reason to believe that maximum production has yet been reached. It is true that the tremendous food requirements resulting from World War II caused a temporary shortage of proteins, yet at the same time it stimulated and expanded agricultural production, which permits expectation that the postwar period will provide surplus proteins in our domestic market. This also has a bearing on estimating the supply of individual proteins, for whereas the byproduct nature of industrial proteins of animal origin may be one of their limiting factors, there is no such visible limitation to the production of vegetable proteins. The proteinaceous materials resulting from the processing of oil and starch, and the production of animal feed provides a very large and cheap source of materials from which to draw for protein production. The expansion of the uses of vegetable proteins therefore will be determined ultimately by their cost of production and the ingenuity of chemists in technical development.

The factors bearing on utilization of a plentiful supply of industrial proteins will also have a bearing on how successfully these proteins meet competition by other materials. Starch glues have given competition for 60 years; and more recently certain of the high polymers, such as the phenolic resins, are taking a very important place in the adhesive and glue industry.

In the present discussion, certain important proteins such as wool, silk, hair, and hides have not been included because they are utilized largely in their original form. In passing over these products, however, it is worth noting that their heretofore unchallenged position in their respective fields is in many ways affected by new chemical developments, and it is evident that continuation of their eminent position will be maintained only by improvement through chemical research as it applies to them.

In appraising the proteins as industrial raw materials it is important, therefore, to view them in the light of the abundance of the materials from which they are prepared, their respective costs in comparison with competititve materials, their present uses, and the possibility of developing new products through research. The disturbance of economic conditions by the recent war forestalls an accurate evaluation of some of these factors, but the data available are sufficient to indicate the general trends.

THE ANIMAL PROTEINS

The industrial animal proteins include (a) the packing house byproducts usually known by the names of animal glue, photographic gelatin, and edible gelatin, (b) fish glue, and (c) casein. Animal glues are manufactured in larger tonnage than any other isolated protein and their use finds the greatest diversification in end products. The woodworking industry is credited as being the largest consumer of animal glue, followed by the paper industry in the making of gummed labels and paper boxes. The rayon textile industry was reported recently[10] to be using in excess of 10 million pounds of animal glue yearly as a sizing material. Other important uses are for kalsomine, matches, sandpaper, and hectograph duplicating processes. More limited but quite important uses are for book binding, rubber processing, coopering, and for the manufacture of print rollers and emery wheels. Yearly production of animal glues has ranged from 105 to 121 million pounds, with about 60 percent made from hides and 40 percent from bones. The U. S. Tariff Commission Report No. 135 on Glues, Gelatin, and Related Products gives prewar prices of hide glue in the range of 15-23 cents and of bone glue 11-14½ cents per pound.

Photographic gelatin is a highly specialized product, and its specifications, methods of manufacture, and data on domestic production are not generally available. Imports[11] before the war, principally from Germany, reached a peak of around one million pounds in 1937. It is probable that imports at that time did not account for more than 20 percent of the total consumption. Photographic gelatin is our most expensive protein, and although the prices vary considerably, it may be placed roughly at $1 per pound.

Domestic edible gelatin, which is manufactured in much the same manner as animal glue, with the exception of its being maintained in a highly sanitary condition, has been produced in recent years at the rate of 20 to 23 million pounds annually, and its selling price has ranged from 30 to 35 cents a pound.

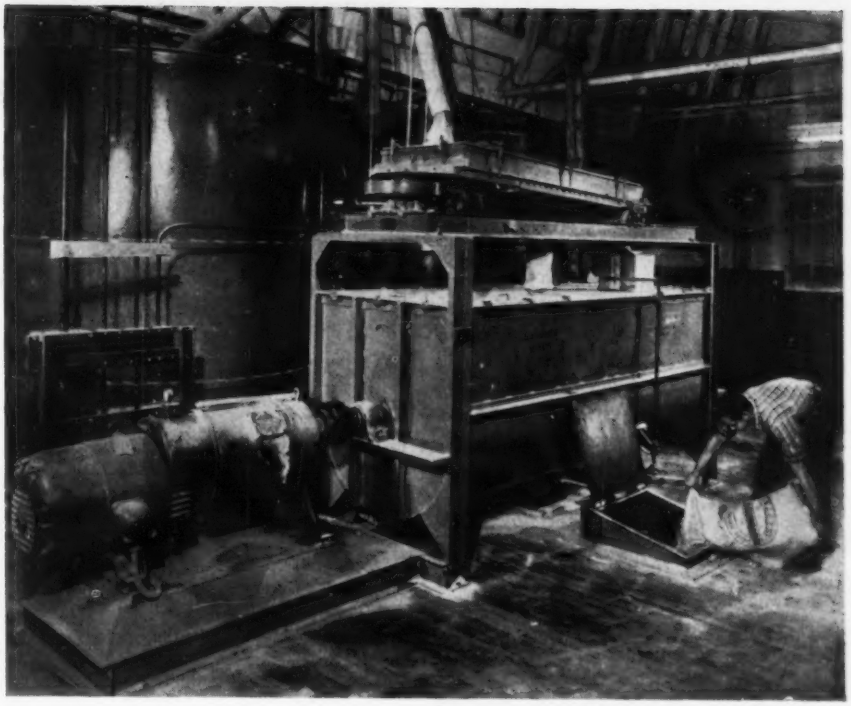
In addition to research on animal proteins now on the market, research also is under way on the development of protein byproducts of the poultry industry; efforts are centered on chicken feathers and egg white obtained from broken egg shells in the powdered egg industry.

Perhaps the most interesting and spectacular investigation reported on these poultry products is in the development of textile fibers. Lundgren et al.[7] have made egg white fibers with tensile strength values when dry up to 70,000 lbs/sq.in. and chicken keratin fibers with strengths as high as 80,000 lbs/sq.in. These unusually high strength values are very significant with respect to the future possibilities of protein fibers.

Recently is was announced[1] that chicken feathers can be converted into useful textile materials by physical methods. With the aid of a specially designed machine the fine elements of feathers can be separated from the quills and blended with other textiles.

Fish glue, a product of the waste materials of the fishing industry, is produced at an annual rate of three to four million pounds. Normally it sells at 20 to 22 cents a pound. About half of the fish glue now produced is packaged in small containers for manifold household purposes; its other most important use is in photoengraving.

Isinglass, an interesting product, is made mechanically from fish sounds (bladders) and is used chiefly in clarifying beer and wines. It has been produced



Aralac, Inc.

Casein is poured into a hopper at the start of the manufacture of Aralac, a casein fiber.

intermittently in this country, but maximum output has not exceeded 85,000 pounds.

The total value of glue and gelatin products, including fish, as reported by the Census of Manufactures[5] has increased from $5,300,000 in 1899 to $34,300,000 in 1939, with a maximum annual value thus far of $40,600,000 in 1937.

Casein, a byproduct of the dairy industry, is second in importance to the so-called packing house glues. It is a protein of skim milk, precipitated either by acid or rennet. Skim milk is also the source of the important food product known as "non-fat dry milk solids". The dry milk solids constitute the entire solids content of skim milk, and the precipitated casein amounts to over one-third of this total. In a competititve market the dry milk solids is the more valuable product and has first call on the supply of skim milk, which places casein at a serious disadvantage and accounts in large measure for its fluctuations in production and in price.

To offset these fluctuations in domestic production, imports of casein have been heavy, the principal source of foreign supply being Argentina. The import duty was 5.5 cents a pound until 1941 when it was reduced to 2.75 cents. A clear picture of the situation is revealed in the accompanying table, which shows domestic production, imports, and average prices for a number of years.

Data in the table show that both the domestic production and the importation of casein have been advancing over a period of years, with the imports increasing more rapidly than domestic production. The large imports of casein in recent years may have been due to the war. The maximum supply of casein for which records are available is 88.8 million pounds for 1941.

The most important use for casein is in the paper coating field which normally consumes approximately 70 percent of the total supply, and another one of the most important products of casein is textile fibers, production of which started in this country about 1938. A production capacity for fiber of 1,000,000 pounds a month has been reported. Since the casein fiber has properties differing from those of rayon, cotton, and other fibers and possessing, in fact, a resiliency resembling that of wool, it is believed to have a very promising future.

A new project closely related to the development of textile fibers and inspired by war shortages in hog bristles is the production of artificial bristles from protein. These bristles are recommended for use in paint brushes and similar products. While the initial experiments were worked out with casein, other proteins such as soybean protein and zein may prove equally satisfactory. The results on bristle development as described by McMeekin and others[9] are very encouraging for a new application of proteins.

National Foam System, Inc.

During the war, the greater share of the production of soybean protein was allocated to the Navy for use in a fire extinguisher mixture, where it served to provide a heavy, durable foam.

Substantial quantities of casein are used in plastics for making buttons, buckles, ornaments, plywood adhesives, cord tires, water paints, and leather finishes. It also is in demand as a spreader and adhesive in insecticide sprays, for special foods, and for medicinal purposes.

VEGETABLE PROTEINS

The vegetable proteins, as indicated previously, have entered the protein field in comparatively recent years, due to the remarkable strides in soybean production and to research in utilization of farm crops. Inasmuch as we may expect little if any substantial increase in the quantities of animal protein available for industrial use, a steady and abundant supply of vegetable proteins is of utmost importance.

Vegetable protein supply may be based partly on the adaptability of soybeans to fit into good land use practices and cropping plans. This crop can be utilized by farmers either as a cash seed crop or for forage. There also has developed among farmers a greater understanding and appreciation of balanced livestock rations, resulting in a definite dependence on soybeans to supply a part of the feed requirements of farm animals and poultry. Furthermore, the phenomenal success of soybeans as a farm crop over other possible sources of oil and protein, can be accounted for in large measure by the ease of cultivation and harvesting, thus making the soybean the cheapest source of crude protein. Production of soybeans in 1941 was 100,000,000 bushels, but war requirements for oil nearly doubled this production in each of the ensuing years to date.

The solvent-extracted soybean meal, containing about 45 percent protein, is the raw material for protein isolation. In 1937-39 this meal sold at about 1½ cents a pound. Production figures for isolated soybean protein are not available, but the annual capacity is reported to be in excess of 15,000,000 pounds, and more production capacity is known to be contemplated.

Before the war, soybean protein was sold principally to the paper industry for sizing and coating paper; substantial amounts were used also for the manufacture of water paints. During the war, the greater share of the production was allocated to the Navy as a fire extinguisher,[12] a use in which it is unexcelled.

Zein, the alcohol-soluble protein of corn, is extracted from corn gluten, which is the protein concentrate obtained during the wet-milling of corn in the manufacture of corn starch. The potential yield of zein is 3 pounds per bushel of processed corn, and the corn wet-milling industry is processing in excess of 110,000,000 bushels of corn annually. Zein is used in ink manufacture, in making excellent phonograph records and as a special coating for paper, but its most important application, greatly stimulated during the war, is in combination with rosin as a shellac replacement.

Soybean protein, zein, and peanut protein are under investigation as a source of textile fibers. The work on zein fibers[6] is advancing rapidly and is ready for large-scale pilot plant operation. The published data give dry tensile strength values of 1.25 g./denier and wet strength values of 0.55 g./denier, while unpublished results show substantial improvements over these values. Other important prop-

erties of the fiber, such as shrinkage, can be controlled. Soybean fibers are in pilot plant production,[3] and reports indicate these fibers are equal to the commercial casein fibers now in use. Peanut protein fibers are in the pilot-plant stage of production in England.[11] They are called "Ardil," and their commercial production seems to be assured.

The chemistry involved in the formation of textile fibers from proteins is exceedingly complicated and has slowed the progress of this development. The evidence thus far accumulated, however, leaves little doubt that production of protein textile fibers ultimately will develop into an important industry.

The use of proteins as protective colloids in oil emulsion paints deserves special mention. This application is progressing without systematic technological attention, but it is increasing steadily in popularity.

While soybean protein and zein are the only isolated vegetable proteins currently produced in substantial tonnage, a number of other proteinaceous materials are available for protein production, and an intensive research program is under way on isolating these materials and studying their properties. The more important members of this group include peanuts, cottonseed, flaxseed and wheat.

Other protein and oil-rich seeds under investigation as new farm crops and which are potential sources of protein include sunflower, castor bean, safflower, mustard, and fanweed. The probable success of these crops will depend as much on their soil and climatic requirements and their ease of cultivation and harvesting as it will upon their yields and composition.

PROTEINACEOUS MATERIALS

The oil-free meal derived from oil seeds or cereal grains and containing 40 to 70 percent protein is not only a raw material for the manufacture of isolated protein but it also has many potential industrial applications. The I. F. Laucks Company introduced soybean meal glue to the Douglas Fir Plywood Industry in 1927 where it has played an important role in plywood development. The tonnage consumed is greater than that of any other plywood adhesive, and total consumption in the hard and soft plywood industries has ranged from 20,000,000 to 45,000,000 pounds annually. The wallpaper industry utilizes substantial quantities of soybean meal as an adhesive. In recent years this meal has also been used with satisfactory results in combination with casein for the brush coating of paper and in the formulation of water paints.

The Ford Motor Company was probably the first to use soybean meal as an extender for phenolic resins. Laboratory investigations[8] have shown that the standard soybean meal, normally used for stock feed, is not as satisfactory for this application as the special meal preparations which have had their water-soluble fractions removed. The war interrupted the progress of this plastic development, but with the return of peace a renewed interest in this application is expected.

Recent investigations have shown that soybean meal, corn gluten, and probably the other proteinaceous materials can be used to excellent advantage in extending phenolic resin for fabricating waterproof plywood glue.[2] When used for this purpose, as for plastics, the meal must be low in water soluble constituents. The cost of such products is low, ranging from three to five cents per pound, and their use effects a substantial saving in the cost of a waterproof glue line.

Burnett and associates,[4] working with peanut and soybean proteins, have demonstrated for the first time that these materials can be used in the preparation of tacky and remoistening adhesives. With the paper industry intensively developing new types of packaging and other designs of paper fabrication, an additional supply of tacky adhesives should find a ready market.

CHEMISTRY AND COMPETITION

The various isolated proteins differ markedly in physical and chemical properties. This difference along with a difference in source of supply and price structure has kept them largely in separate fields of application and minimized competition between them. The two proteins which are most competitive are casein and soybean protein. It is worth noting, however, that soybean protein came into very substantial production during a period when the total supply of casein was greatly increased.

Packing house and fish glues, which are the only truly water-soluble industrial proteins, are noted for their excellent gelling characteristics at low protein concentration. The casein and soybean proteins are readily dispersed in a mild alkaline solution, whereas zein is the only industrial protein soluble in organic solvents. This gives zein a field of application not generally invaded by the other proteins.

The high molecular weight of the proteins brings their chemistry into close comparison with synthetic polymer chemistry. Perhaps the chief difference in protein chemistry and that of the high polymers is that the protein molecule is made up of a greater variety of building units, since they may contain 15 or more different amino acids. The proteins also have a high percentage of their molecular weight in their side chain structure and possess a highly polar group at the ends of most of the side chains. In fact, there is no high polymer of commercial importance that can equal a protein in proportion of polar groups. Translated into practical results, the highly polar nature of proteins gives them a greater water absorbing capacity than most of the synthetic polymers.

The problems of plastic flow and cross-linking, which are very important in plastic investigations, and that of the orientation of chain structures in fiber formation are common to both synthetic high polymers and proteins.

While the chemistry of proteins has been slower to unfold than the chemistry of other natural products, major advances have been made in this subject during recent years. The combination of new advances in protein chemistry, with the continued development of fibers, paints, and other products, and the natural growth of industries that depend upon proteins indicate a substantial increase in the future use of industrial proteins.

CASEIN, DRIED: UNITED STATES PRODUCTION, IMPORTS, AND NEW YORK PRICE, 1929-43

Year	Production 1,000 pounds	Imports for consumption 1,000 pounds	Average price per pound, 20-30 mesh at New York Cents
1929	30,537	27,583	15.6
1930	41,965	18,500	13.1
1931	35,335	3,503	7.6
1932	24,428	1,201	6.3
1933	24,087	8,142	11.0
1934	37,331	1,491	11.8
1935	37,638	3,230	12.2
1936	46,140	16,209	16.1
1937	67,467	5,210	14.7
1938	48,549	417	8.6
1939	40,878	15,832	12.0
1940	46,616	24,523	12.6
1941	47,346	41,518	21.4
1942	42,268	16,800	20.9
1943	18,388	28,000	22.3
1944	14,900	47,000	
1945	13,355	[1]	[2]24.0

[1] January to June total is 29 million pounds.
[2] Ceiling price casein during war was 24 cents, recently advanced to 33 cents per pound.

Bureau of Agricultural Economics. Imports compiled from records of Bureau of Foreign and Domestic Commerce. Prices compiled from *Oil, Paint, and Drug Reporter*, New York.

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Why Lead Is Scarce

EDITORIAL STAFF REPORT

IN THE EARLY PART OF THE WAR, lead was the only metal obtainable without specific allocation. Now, after cessation of wartime demand, it is in extremely short supply. The principal reasons for this condition, both supply and demand, are discussed here.

LEAD has become a "precious" metal. Not in price, but certainly in availability. This latter condition is perhaps most forcibly expressed by the estimate of the Civilian Production Administration (Table I) which shows the total supply of available lead to be about 21% under the estimated unrestricted demand.

There are a number of reasons for this situation. On the supply side these include:

1. Strikes, particularly in the Western mines and smelters.
2. Low OPA ceiling price. This is a complex situation, and the true picture is beclouded by the partially justified demands of several powerful interests.
3. Inadequate exploration during the war years.
4. Sudden reduction of imports without a corresponding reduction in demand.

For consumption, we have a tug-of-war between the housing program, the petroleum industry and the automobile industry, the latter with its requirements of lead for batteries and bearing metals as well as an interest in increased supplies of high octane fuels.

SUPPLY

Prior to the war the demand for lead was met by a large domestic production, secondary lead recovery and a relatively small volume of imports, which never greatly exceeded imports until 1940 (See Table 2). For this year imports increased nearly 320% while exports dropped off to less than ⅓ of those for 1939. This sudden increase in imports was occasioned by the government's desire to build up a large stockpile of this metal before the war clouds became too thick. Eventually, however, the insatiable demands of war practically exhausted the stockpile, and current demand is running some 22% over prewar (Table 1). At the same time imports have been reduced about 30% from 1945.

LABOR

Labor problems stem from two sources, an inadequate supply and, as in all industry, a restive supply with the accompanying work stoppages and hampering of production. The latest report[2] from the Bureau of Mines states that unsettled labor conditions at the mines and smelters, especially in Western states, were largely responsible for the decline in lead production that took place in March.

Clinton H. Crane, president of St. Joseph Lead Co., in a recent address[3] noted that all mines outside of Southeast Missouri, a relatively minor producing area, lacked some 2,200 men of having a full crew of 8,200.

CEILING PRICE

Because of the complexity of the situation and the very definite and very positive opinions held by many on this matter, a strictly factual analysis of this problem is extremely difficult to make.

The present OPA ceiling price is 6.5 cents per pound. This figure, however, does not reflect the cost of primary lead, as it has been estimated that the average price paid under the premium price plan in 1945, exclusive of the Tri-State area, was 8.75 cents per pound. According to Mr. Wormser of the Lead Industries Association, the source of the above figure, the addition of the Tri-State figures would change this value only slightly. This latter figure, 8.75 cents per pound, is quite close to the present price of lead (8-9 cents per pound) delivered in Europe. The British Ministry of Supply is paying 8.09 cents per pound while in this country the Office of Metal Reserve has paid 7.75 cents per pound, f.o.b. New York, absorbing the difference between this figure and the OPA ceiling price of 6.5 cents per pound. Private imports of lead are economically impossible even if the government would allow them inasmuch as the cost in New York would be 9.75 cents per pound (metal cost plus 2 cents per pound duty). This is 3.75 cents per pound above the OPA ceiling price.

In operation, the premium price plan, noted above, results in allowances for depletion and depreciation on the basis of cost of mining not on the basis of actual depreciation and depletion sustained.[5] The production quota above which the mines may receive a subsidy, is subject to change on 30 days notice if the cost decreases or the grade of ore increases. These latter conditions would seem to work against attempts at more efficient operation as there is no increased profit if costs are reduced or a higher grade of ore discovered.

TABLE 1. PRIMARY AND SECONDARY LEAD

(in thousands of short tons)

	1945			1946	
	Est. Comparable Prewar Quarter	3rd Quarter	Est. 4th Quarter	First Quarter Allocation	Unrestricted Requirements Quarter[a]
Storage Batteries	50	75	78	66	80
Cable Covering	18	22	29	33	37
Chemicals, including paint	35	31	45	39	45
Ammunition	10	12	11	9	12
Tetraethyl	8	16	13	10	15
Sheet & Pipe	12	17	18	16	16
Solder	6	12	12	12	12
Bearing Metal	6	10	9	9	9
Brass & Bronze	6	8	8	8	8
Foil	5	3	2	2	5
Other & Unclassified	24	34	35	53[b]	40
Exports	n.a	c	c	c	3
Total Consumption	180	240	260[d]	257[e]	285
New Supply (dom. & for.)	184	260	270[d]	214[e]	225
Surplus and/or deficit	4	20	10	43	60
Reserve Stocks, end of period[f]		80	69	42[g]	

a. Assumes no control on consumption.
b. Includes an appeal reserve of 20,000 tons (5000 primary, 15,000 secondary) to be distributed among the various consuming groups.
c. Less than 500 tons.
d. Although reports are not in for the fourth quarter, other evidence indicates that new supply exceeded consumption by 10,000 tons but at the same time the government reserve stocks declined 11,000 tons. The difference being accounted for by a corresponding rise in private stocks.
e. The decrease in supplies comes from the reduced availability of imports and also strikes in Mexico.
f. Except for the increase noted in note c above private stocks are believed to be near minimum working levels.
g. Out of the 43,000 tons estimated deficit, only 24,000 tons is expected to be made up from stocks of secondary lead.

TABLE 2. TOTAL LEAD SUPPLY

	Domestic[d] Production	Imports[c] (in short tons)	Exports[b]	Secondary Lead
1929	647,995[a]	116,059	116,269	311,000
1937	464,892	40,806	20,091	275,100
1938	369,726	63,901	45,866	224,900
1939	413,979	86,883	74,392	241,500
1940	457,392	282,492	23,755	260,346
1941	461,426	381,214	14,359	397,416
1942	496,239	488,434	1,940	323,001
1943	453,313	245,000[e]	2,003	.....
1944	416,861	226,000[e]	15,523	.....
1945	388,968	255,000[e]	.....	328,000
1946 (1st 3 mos.)	92,463	.....	f	65,383

All figures from Bureau of Mines unless otherwise noted.
a. Exclusive of output from Virginia.
b. Pig Lead.
c. Total Lead imports.
d. Mine production of recoverable lead.
e. Primary Lead—C.P.A. Release No. 224. March 11, 1946.
f. Less than 500 tons.

During the first part of the war, lead was the only metal obtainable without specific allocation. As a result of this rosy supply picture, it is reported that exploration all but ceased in order to save labor and materials.

INADEQUATE EXPLORATION

Combining this fact with the statement of spokesmen of the industry, still another reason for the present shortage is arrived at which, in the long run, may cause the most difficulty. According to these spokesmen, it has been the practice of the major producers to prove the reserves ahead for only 5 or 6 years operation because of the heavy capital investment required. Such a cutback as has occurred in exploration can only be remedied by intensive exploration during the next few months.

IMPORTS

As can be seen from Table 2, imports have been a major factor only since 1940 and were reported[5] to be limited to a total of 120,000 tons for 1946 by an informal agreement between Washington officials and representatives of other governments. However, it is stated that imports for the second quarter are not to exceed 7,500 tons per month. Any increase, even in a free market, will obviously require a higher domestic price than 6.50 cents, as the last U. S. imports are said to cost 7.75 cents per pound exclusive of the import duty of 2 cents per pound. The increased bidding for lead supplies occasioned by any release to a free market would probably force the free domestic price above 10 cents per pound, over 50% higher than the present OPA ceiling price but only 1.25 cents per pound above the ceiling price plus the average subsidy paid to domestic lead producers. Nevertheless, this would appear to be a plausible step, as instead of paying out 2.25 cents per pound as subsidy on domestic production (Table 4) the government would begin to receive 2 cents per pound on imports. In any case the overall cost to the consumer would increase until supply and demand, as altered by increasing substitution of other products and extended exploration, meet. A general idea of the world supply situation can be obtained from Table 33.

CONSUMPTION

Table 1 indicates a burgeoning of demand in practically every major use for lead. In some cases substitutes are possible, particularly if the price is allowed to advance. In other uses substitutes are almost out of the question.

Batteries.—From Table 1, it is seen that storage batteries require approximately 25% of the total lead supply. However, this figure does not reflect the actual consumption of lead by this industry, as batteries provide by far the largest source of lead scrap. When the automobile industry is allowed to move its production into high gear, still further increased quantities will be required here to provide new car equipment.

Pigments.—At the present time the nation is suffering from a grievous shortage of housing facilities, forcing the construction of many new dwelling units in a very short period of time. Each of these houses must be painted, probably with a white-pigmented paint.

The principal part of the white pigment market is taken over by three pigment, titanium dioxide, white lead and lithophone. Titanium-based pigments are also in extremely short supply, forcing increasing reliance on white lead and lithophone. White lead is also short so we must turn to lithophone but here we have a pigment the production of which has been on the wane for several years. Thus, there is little chance for any major substitution here.

Insecticides.—The ability of the newer organic insecticides to replace lead arsenate appears to be unquestioned for many uses and we may expect to see a decrease in the use of lead for this purpose.

Tetraethyl Lead.—Probably the best advertised of the problems created by the shortage of lead is that created by the short supply of TEL. According to recently published Civilian Production Administration figures, the lead allotments for the second quarter of 1946 are running at a rate of about 11,000 tons per quarter, over 37% higher than for a comparable prewar quarter (Table 1). In the meantime motor fuel consumption has increased 15%* with an increase in octane ceiling to 80, whereas the prewar octane ceiling was about 76-77. In this connection it should be noted that a reduction in octane rating, first proposed by the industry[6], has recently been planned by the Civilian Production Administration.

TABLE 3. WORLD LEAD PRODUCTION AND CONSUMPTION[2]

(in short tons)

	1926		1937		1945
	Production	*Consumption*	*Production*	*Consumption*	*Production*
United States	696,000	753,940	464,892	550,220	388,969
Canada	141,386	33,330	206,000	26,290	172,728
Newfoundland	.....	.....	32,229	.....	27,900
Mexico	220,879	.....	240,448	.....	225,875
Total North America	1,058,265	787,270	943,569	576,510	815,472
Argentina	9,370		17,247		20,200
Bolivia			20,062		10,481
Chile	10,100	38,060	714	23,100	.....
Peru			46,338		57,800
Total South America	19,470	38,060	84,361	23,100	88,481
Australia	170,412	16,500	275,555	26,840	194,100
Belgium	68,080	38,060	.....	49,500	.....
France	21,495	99,220	5,115	118,030	4,000
Great Britain	4,777	280,060	29,560	381,810	4,000
Netherlands	.....	16,500	.....	25,850	.....
Spain	162,470	24,200	34,472	16,500	28,853
Sweden	.....	6,050	10,218	21,230	11,500
Switzerland	.....	11,770	.....	10,230	.....
Total Europe	256,822	475,860	79,365	623,150	48,353
Grand Total	1,504,969	1,317,690	1,382,850	1,249,600	1,146,406
Austria	7,141	13,640	9,590	7,260	.....
Bulgaria	.....	.....	180	.....	.....
Czechoslovakia	2,537	10,780	4,174	20,900	.....
Finland	.....	.....	272	.....	.....
Germany	84,436	167,970	82,673	258,830	.....
Poland	30,648	.....	6,834	13,200	.....
Romania	.....	.....	7,413	.....	.....
Russia	1,479	24,200	60,600	106,700	.....
Yugoslavia	10,812	.....	78,263	2,200	.....
Other Europe	621	18,700	.....	24,200	.....
Total	137,674	235,290	249,999	433,290	.....
Burma (India)	60,849	.....	87,024	.....	.....
China inc. Hong Kong	.....	.....	2,200	.....	.....
Japan	3,978	64,240	11,243	132,000	.....
Korea	.....	.....	6,448	.....	.....
Other Asia	.....	26,950	.....	22,000	.....
Total Asia	64,827	91,190	106,915	154,000	.....
World Total	1,750,000	1,700,000	1,845,000	1,920,000	.....

The above production figures are on a mine basis and are from reports of the American Bureau of Metal Statistics.

* Motor fuel production (1st two mos. 1946) = 117,618,000 barrels or about 700,000,000 barrels per year. Production in 1940 was 616,695,000 barrels.

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TABLE 4. LEAD COST[5]

(cents per pound)

	Average New York Price	*Average[1] Subsidy*
1929	6.83	.....
1937	6.01	.....
1938	4.74	.....
1939	5.05	.....
1940	5.18	.....
1941	5.79	.....
1942	6.48	0.41
1943	6.50	0.99
1944	6.50	1.57
1945	6.50	2.25

[1] Exclusive of Tri-State Area.

CHEMICAL SMOKES and Smoke Screens

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CHEMICAL SMOKES REALLY CAME OF AGE during the past war, and the tactical use of man-made fogs became an exact, life-saving art. For the first time, entire infantry divisions, fleets, and whole cities, could be shrouded from aerial observation by artificially-generated mantles. Herein, the author describes types of petroleum-based smokes—both ordinary and colored—outlines smoke-generating formulations and equipment, and notes peacetime applications.

THE use of specially generated smoke screens as a military defensive agent is well established but it was not until the first World War that such smoke screens were employed extensively. In World War II, the more mobile type of warfare, and wider utilization of the airplane, posed new problems and fostered further developments in the formulation and production of chemical screens. Special compositions and casting equipment had to be developed, to shroud troop movements and conceal industrial targets both by conventional and colored camouflage smokes.

The stability or useful longevity of smoke screens is naturally a function of the nature of the particles of which they are comprised while their permanence of location is a dependent on wind velocity. Smoke screens, so called, are basically of two compositions, viz, a dispersion of solid particles in air—which are true smokes—and dispersions of minute liquid droplets in an atmosphere in which they will not, or cannot, be converted to the gaseous phase. The latter corresponds to natural fogs and mists, both of which are dispersions of liquid particles in air existing only when the relative humidity is close to the saturation point. The term, "fumes," usually refers to minute particles of products other than water, and liquids or solids dispersed in the atmosphere.

FORMS OF SMOKES

Initially, military smokes were formed by burning oils with restricted amounts of air resulting in dense black smokes. Or, burning oils and moist straw with a limited amount of air, to yield gray smokes. In the first case, the smokes consist of fine particles of dispersed carbon: in the latter, carbon particles plus water vapor. If the relative humidity is high, both smokes are fairly permanent. If not, the latter type changes from gray to black as the water droplets evaporate.

To cast smoke screens over extensive areas to obliterate communities, or even nominally large areas such as docks, industrial plants and the like, it becomes necessary to use some medium for the formation of screens which is low in cost and can readily be formed into a screen of good opacity, and possessing a reasonable degree of permanence. Petroleum products closely approximate these conditions, both when burned for the formation of black smokes or when vaporized to yield white screens.

Crude petroleum has been, and is still used, by the various navies to form smoke screens at sea by burning with a restricted air supply. However, for the formation of white smokes only the lubricating oil fractions serve effectively. Chemical Warfare Service, Marine Corps and Army Engineers at Fort Belvoir, Va., were actively engaged in studying the utility of lubricating oil vapor as a screen forming medium. While its obscuring power is substantially less than phosphorous pentoxide, titanium tetrachloride, zinc, and hexachlorethane, nevertheless it is more effective on a cost basis.

SMOKE COMPOSITIONS

However, lubricating oil vapor, alone, does not produce wholly satisfactory results, in view of the fact that oil vapor smokes have to be formed by both an atomizing device and a considerable degree of heat. Hence, the heated gases tend to rise with a consequent lessening of obscuring power. Therefore, its value is doubly enhanced when ammonium chloride is added to the oil. When the source of heat vaporizes the oil, the ammonium chloride becomes divided into small particles, giving greater opacity to the screen and also contributing somewhat to its average density so that it holds close to the ground longer. In order to prevent the ammonium chloride from settling out too rapidly in the oil drums, sodium or aluminum stearate is dissolved in the oil to increase its viscosity.

A preferred formula used by the armed forces was made up of lubricating oil of poor viscosity index and SAE viscosity of 10 to 20 seconds at 210°F. forming about 87 per cent by weight of the composition. Incorporated therein was 0.5 per cent to 1.7 per cent sodium stearate and 12.5 per cent ammonium chloride.

Early in the war the need for smokes other than the white or black types previously described became apparent, to serve not merely for obscuring or signalling but primarily for camouflage purposes. For, although the movement of armed forces may be completely concealed by an effective smoke or oil vapor screen, such a jet black or snow white smoke was conspicuous and served as an excellent bomb or strafing shell target.

Therefore, the urgent need for less visible screens, as viewed from aircraft, was forcefully stressed—screens which had to have a color value closely simulating the terrain. This meant foliage green smokes for use on Guadalcanal and tan smokes for the shores and sands of North Africa. Accordingly, intensive efforts were directed toward means for tinting white smokes with suitable agents. This end was successfully achieved by the use of both dyes and pigments.

Dyes belonging to the anthraquinone groups served satisfactorily in a concentration from one to three pounds of dyestuffs per gallon of oil vapor smoke composition. Representative dyes include: methyl amino anthraquinone for red; auramine "O" for yellow; 1,4,Di-p-toluidine anthraquinone and auramine "O" for green; para nitraniline and beta napthol for red. The dyestuff need not be soluble in the oil, but if it is, the problem of settling out of the dyes is eliminated and a more uniform smoke is produced. The important requirement of the dyestuff is that it must volatilize at the temperature at which the oil smoke screen is formed.

The vaporization of the dye alone does not produce a satisfactory smoke. It has been found in practice that the best procedure is to color a white smoke to yield a composition with the proper working characteristics which can be successfully handled and cast into effective screens with conventional smoke generating equipment and at a reasonably low cost. When pigments instead of dyes were used to form colored screens, it was found necessary to use two or more separate fluids to effect the

desired results. For example, to produce a tan smoke, raw sienna is suitable. Other pigments, such as ochres, raw and burnt umbers, are also satisfactory. A special smoke generator must be used to form and cast pigmented screens.

To form smokes from pigments automatically and continuously, it is preferable to suspend the pigments in a volatile liquid vehicle. While any volatile liquid can be used, one having a boiling point between 100 and 200°C. is preferable. This liquid is admitted into the smoke generator some distance from where the oil vapor smoke fluid enters. The two fluids cannot be mixed before casting into a smoke for, if they are, no matter what the color or amount of the pigment used, a white smoke, as in the case with oil alone, results. In other words prior mixing yields a smoke in which the pigmented particles are encased in a film of oil.

SMOKE GENERATING EQUIPMENT

For the formation of small volumes of smoke for screening limited areas for short periods of time, cans of the grenade type may be used. These contain a combustible material such as a hydrocarbon or sulphur, a supplier of oxygen such as potassium chlorate, and ammonium chloride. However, to attain continuous generation of volumes of smoke, four essentials must be considered; namely, a satisfactory and adequate source of heat to vaporize the oil; an atomizing nozzle to accelerate vaporization; a means of rapidly moving the vapors to and from the heat source, such as a pump or blower; and an atmosphere free from oxygen. otherwise at the temperature of vaporization and in view of the concentration of oil vapor, explosion or combustion would take place.

It so happens that the exhaust manifold of an internal combustion engine closely approximates these conditions. Accordingly, a standard automobile or heat engine may be suitably mounted to generate and cast smoke screens. The oil composition is carried in a storage tank above the engine, from which it is drawn or pumped, depending on the viscosity of the oil, the size of the atomizing nozzle, and the rate of smoke generation.

The admitting or atomizing nozzle is fitted into the exhaust manifold at a point a few inches beyond the exhaust ports. The jet must be swept by the burnt moving gases, both to facilitate mixing and to be adequately supplied with heat from these gases. The entire exhaust system should be amply insulated to avoid loss of heat by conduction and radiation and the inner walls of the exhaust pipe should be equipped with baffles or vanes so that the gases will travel in a helical path to effect better dispersion of the vapor globules. The smoke screen is discharged through a perforated exhaust system tail pipe to form a smoke curtain eight to twenty feet high.

A Ford model A standard four cylinder engine can vaporize from five to twenty gallons of oil smoke-forming composition per hour. About eight such units will cast and maintain a blanket smoke screen over a medium size dry dock.

Another type of smoke generator developed by Standard Oil Company and using the same type of oil-base smoke forming compounds, consists of a steam boiler, the steam from which passes through a Venturi nozzle. A smoke composition is admitted through the throat of the nozzle, where it is mixed with steam, and discharged to the atmosphere. This is a more effective method of smoke generation than the gasoline engine type and of much greater capacity per unit. The cost of smoke casting is considerably less, and the steam contributes to screen opacity. However, the steam fog is comparatively short lived except where the relative humidity is very high.

The oil smoke compound described can be cast in the form of a blanket screen to shroud a square mile for about $200 per hour, with an air movement of five m. p. h. or less. Using the steam smoke generator type an equivalent screen can be cast for about $160.

POSTWAR APPLICATIONS

A significant postwar application of smoke screens has been their use as an insulating blanket to protect late maturing sugar cane from frost. In particular, some of these canes are not cut until the early part of December and in that they are grown in latitudes approximately 150 miles north of the Gulf Shore, temperatures below freezing frequently destroy crops through the inversion of the sucrose in the cane juices.

Smoke screens, made up of properly atomized petroleum bases and formulated to have a density sufficient to lie fairly close to the ground, provide adequate protection against freezing provided a temperature differential not exceeding 3°F. obtains. However, as the temperature seldom falls more than this amount, many valuable crops have been saved by the utilization of such a technique.

Most of these screens are discharged by means of a steam jet and Venturi nozzle as described previously, which while it costs less per 100 square feet covered is not quite as effective an insulator as the screens cast by the gasoline engine. A striking aspect of this application is that the worth of military screens is based upon their capacity, while their usefulness in this case depends upon their resistance to heat transmission.

Too, smoke forming compounds find application in the motion picture industry for the formation of fogs to create certain atmospheric conditions which are to be reproduced. There have also been displays of white smoke screens in parks and playhouses on which multicolored and flood lights have been projected to produce spectacular scenic effects.

The most intriguing aspects of these developments are, however, the single fluid colored smokes. They appear to be the complete complement of colored pyrotechnic lights. Specifically, colored lights are only faintly visible in daylight while colored smokes are most visible in bright sunlight. Conversely, colored lights are most visible at night whereas colored smokes are completely invisible.

In addition, smoke screens have been cast which are visible at night due to the inclusion of fluorescent or phosphorescent pigments such as the polysulphides

(*Turn to page 1044*)

Petroleum-smoke generator being used to protect sugar-cane from frost damage.

Electronics Improve
INDUSTRIAL PROCESS CONTROL
2. Recording Polarograph, High Vacuum and pH Measurement

by DOUGLAS M. CONSIDINE* and DONALD P. ECKMAN**
Brown Instrument Company, Industrial Division of Minneapolis-Honeywell Regulator Company
Philadelphia, Pennsylvania

WITHOUT THE RECENT PROGRESS in measuring and recording instruments discussed here, it would not have been possible to carry out many of the more recent advances in chemical processing. Continuing Chemical Industries description of physical aids to chemical plant control, the structure and application of the recording polarograph and instruments for measuring and recording pH and high vacuums are described.

USE of the electronic potentiometer, discussed last month (page 785), has greatly improved the precision and reducing the time required for polarographic analyses, while the continuous indicating and recording devices for determination of high vacuums and pH are allowing increased reliance on use of these measurements for process control.

POLAROGRAPH

The polarograph is an analytical instrument, both qualitative and quantitative, for determining the chemical constituents of either aqueous or non-aqueous solutions. Although extremely small quantities of material can be detected, it is not limited to micro analysis and in both micro and macro analytical work, it replaces tedious and slow wet chemical methods.

* Application Engineer.
** Development Engineer.

DROPPING MERCURY ELECTRODE

The principle of the dropping mercury electrode, the basis of the polarograph, dates back to 1873, when Lippman—using a capillary containing a stationary thread of mercury—first successfully measured the surface tension of mercury. Several years later, Kucera—in making further studies of the surface tension of mercury—employed a dropping mercury electrode quite similar to the one now used in polarographic analysis. Kucera's method produced anomalous results which he could not explain or eliminate from his experiments. In 1918, Heyrovsky—in attempting to find an explanation of Kucera's results—continued the investigation of electro-capillarity. A galvanometer was employed to measure the currents flowing through the electrode system and it was discovered that the current-voltage curves of solutions which were electrolyzed with a dropping mercury electrode possessed several remarkable qualities, including:

(1) The curves had a characteristic step formation.

(2) The curves were a function of the nature of the solution and were reproducible.

(3) The voltages at which the steps of the curves occurred were characteristics of the components in the reducible substance, permitting qualitative analysis.

(4) The height of the steps was a function of the concentration of the components of the substance in solution, thereby making quantitative analysis possible.

The method of analysis was named polarography; the instrument developed by Heyrovsky was called the polarograph; and the current-voltage curve was termed polarogram.

The dropping mercury electrode, illustrated schematically in Fig. 8, comprises a very fine bore capillary tube connected by a neoprene tube to a mercury reservoir and placed in the solution so that very fine drops of mercury are formed beneath the surface. The rate of mercury flow

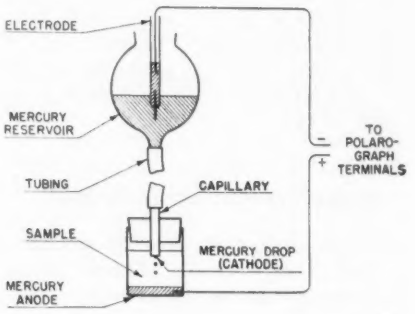


Fig. 8. Dropping mercury electrode.

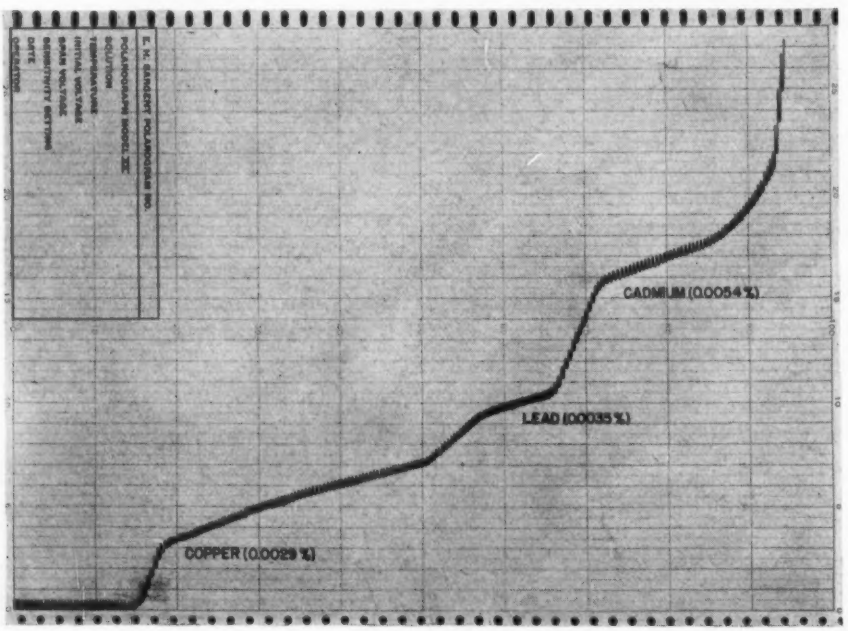


Fig. 9. Polarogram of copper, lead and cadmium in a high purity zinc base die cast alloy.

Courtesy E. H. Sargent & Co.
Fig. 10. High speed visible recording polarograph.

may be adjusted by varying the height of the mercury reservoir and normally amounts to a drop every one to three seconds. The mercury reservoir is connected to one terminal of the polarograph; the other cell terminal is a pool of mercury in the bottom of the solution vessel.

In operation, a few drops of mercury added to the sample, act as one electrode of the cell. The dropping mercury eiectrode is next inserted. An inert gas, usually nitrogen, is then bubbled through the solution to remove atmospheric oxygen which is reducible and glves a polarographic wave not usually of interest to the analyst. As the voltage impressed on the cell is slowly raised the current remains nearly constant until a voltage is reached at which a component of the solution is reducible. The current then rises sharply to a new level, at which it remains constant until the voltage is reached at which a second component is reducible. Another sharp rise in current to a new constant value then occurs. These sharp rises in current are called polarographic steps or waves.

Since the polarographic steps for the various components in the sample occur at different voltages, several substances may be determined in one solution on a single polarogram, as illustrated in Fig. 9. Note the small percentages of copper, lead, and cadmium determined in a high purity zinc base die cast alloy.

During his early experiments, Heyrovsky found that manual plotting of polarograms was laborious and subject to experimental error. An automatic instrument was needed with the following characteristics: (1) continuous operation to show all details of the curves, (2) fast operation since current-voltage changes occur rapidly, (3) high sensitivity since the currents involved are often fractions of a microampere.

A photographic recorder was developed which partially answered the needs. Although a great improvement, photographic recording has many limitations, including:

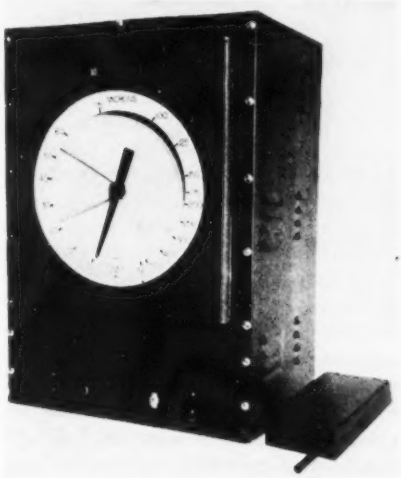
(1) Time and labor required for photographic development of polarograms were considerable.

(2) Current-voltage curves were not visible while the analysis was being made. Visible chart recording permits prompt readjustment of operation conditions at any stage in the process of the polarograms.

(3) Precision was limited by the size of the record produced. With a strip chart record 12 inches wide, step heights of polarograms can be made very large, permitting greater accuracy in analyzing results. The ruled chart also simplifies the linear measurements required.

By employing a continuously balanced high speed recording potentiometer the above limitations have been overcome. The new unit is illustrated in Fig. 10.

The output from the polarographic cell is fed to the recorder so that the displacement of the pen from zero is determined by the amount of current flowing through the cell. The chart is driven by a constant speed synchronous motor. The polarographic bridge which supplies voltage to the cell is also driven by a synchronous motor so that the chart displacement is



Courtesy Distillation Products Inc.
Fig. 11. Recording Pirani high vacuum gage.

a linear function of the voltage applied to the cell, that is, the time ordinate of the chart becomes, in essence, the voltage ordinate. The record obtained, therefore, is current versus voltage.

Since the recorder pen is continuously visible, the operator is in position to determine when a step is completed and to make immediate readjustments if the curve is too small or too large.

Examples of practical application of the polarograph to process control include (1) the determination of carryover of aluminum chloride catalyst in petroleum processing, and (2) to indicate residual oxides of nitrogen in high explosives.

HIGH VACUA

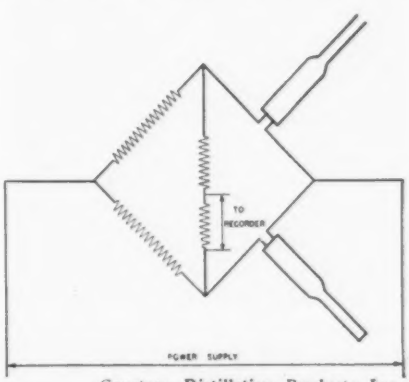
Until recently an absolute pressure of 40 to 50 mm. of mercury was considered a high vacuum. With exception of the manufacture of vacuum tubes, high vacuum techniques were generally confined to the laboratory. Today absolute pressures in the low millimeter and micron ranges are becoming commonplace and are making practical many processes formerly impossible to carry out (CHEMICAL INDUSTRIES, p. 83, July, 1945).

High vacuum measurement roughly falls into three broad ranges, namely: 0-5,000 microns; 0-500 microns, and 0-50 microns. Two types of high vacuum recorders are discussed in this paper, namely: (1) the Pirani Gage, and (2) the McLeod Gage.

RECORDING PIRANI GAGE

The Pirani Gage, illustrated in Fig. 11, is essentially a coil of resistance wire mounted in an envelope which is connected to the system whose pressure is to be measured. The gage is connected into a Wheatstone bridge as one of the four arms. A second gage is usually sealed off at a pressure considerably lower than one micron of mercury and is connected to the bridge as a second arm and is so arranged that changes in its resistance will balance changes in the gage tube resistance due to temperature fluctuations, but not due to pressure changes. The remaining two arms of the bridge are equal fixed resistances. The measuring circuit is illustrated in Fig. 12.

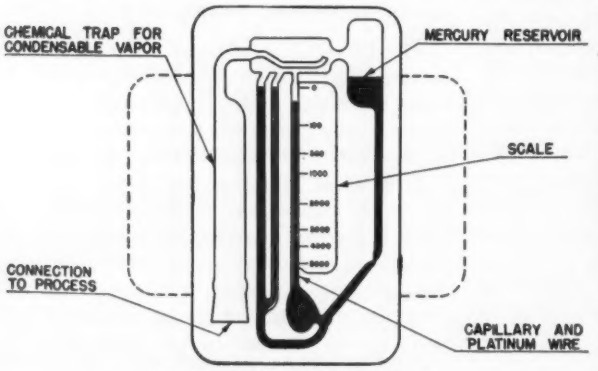
The heat loss from the filament of the gage tube, in pressure range from atmospheric pressure in one millimeter of mercury, is very largely due to convection and conduction. Below one micron of mercury, the major heat loss is due to radiation and conduction. Between the pressures of one millimeter and one micron of mercury, there is a considerable change in the heat loss from the filament due to the sharp change in the convection loss in this region, which causes its temperature to rise and this, in turn, causes its resistance to change and unbalances the bridge. This unbalance results in a current flow through the indicating arm of the bridge. A resistance placed in this arm will have an IR drop develop across it during unbalance which may be used to actuate a recording potentiometer.



Courtesy Distillation Products Inc.
Fig. 12. Pirani circuit.

The potentiometer may be calibrated directly in terms of the pressure in microns.

The balance point of the gage shown in Fig. 12, is taken as the pressure of the sealed-off comparison tube which means that the sensitivity is greatest at the low pressure end of the scale and least at the upper end of the scale. In the range of one micron a change in pressure as little as one-quarter micron may be observed, while at 500 microns a change of 10 to 25 microns may be the minimum change observable with accuracy. This change in sensitivity is due in part to the non-linearity of the scale. The accuracy of calibration is of the order of ±1-2 microns at the low pressure end, ±10-15 microns at the high pressure end of the scale.



Courtesy F. J. Stokes Machine Co.

Fig. 13. McLeod type vacuum gage.

The pen of the potentiometer travels across scale in about 4½ seconds so that even wide variations in pressure are almost instantly recorded. Contacts in the potentiometer recorder may be used for actuating alarm signals or even control circuits. Special sequence programs to fit particular applications may also be worked out with the potentiometer.

McLEOD GAGE

The McLeod gage after 70 years is still the ultimate standard for vacuum measurement and is used in the calibration of other vacuum gages. Non-condensable gases, such as hydrogen, cause no error in readings as with other types of vacuum gages. Condensable vapors, such as water or alcohol, can cause errors unless they are removed by a chemical trap or other means before they reach the measuring chamber of the gage.

The Stokes McLeod gage (Flosdorf-Hall type), illustrated in Fig. 13, is now available for both measuring and recording high vacuums. Measurement is automatically made and recorded at regular intervals so that substantially a continuous record is obtained.

In Fig. 13, the gage is illustrated in its measuring position. The gage is turned periodically, as shown dotted, each cycle to permit the measuring chamber to again be exposed to the pressure of the process. The height to which mercury rises in the capillary of the measuring chamber is determined, of course, by the pressure in that chamber. This height is electrically indicated.

For pressures lower than one micron of mercury, the ionization gage, with a range of 1-0.001 microns, and the Philip's gage, with a range of 20-0.01 microns, also can be adapted for use with recording potentiometers.

pH MEASUREMENT

Hydrogen ion concentration has been measured successfully in the laboratory for many years. The adoption of early laboratory measuring means to continuous indication and automatic recording and controlling of pH in industrial processes was not so successful. The industrial limitations of the hydrogen electrode, which requires a platinum catalytic surface and a pure supply of hydrogen gas, included (1) susceptibility of the catalyst to poisoning, and (2) requirements for a continuous supply of pure hydrogen gas. Quinhydrone and antimony measuring electrodes offered some improvement for certain industrial applications, but these were (1) generally subject to errors in oxidizing and reducing solutions, and (2) susceptible to poisoning by certain ions.

Courtesy Nat. Tech. Labs.

Fig. 14. Flow type pH electrode assembly.

GLASS ELECTRODE

Development of the glass electrode several years ago was the first real step toward industrial pH measuring and controlling applications. These first electrodes were not the complete answer, however. Considerable research into various types of glasses and into the measuring circuits was necessary before many of the shortcomings of the early glass electrodes could be overcome. The shortcomings included: (1) limitation of the electrode to relatively low temperatures, (2) effect of alkaline salts, especially sodium ions above a pH of 9, (3) fragile construction which made careful handling mandatory, and (4) effects of changing humidity and stray currents upon the measuring system.

As a result of research during the past five years, the situation has been changed to the effect that (1) continuous pH measurements can be made in boiling aqueous solutions, (2) accurate measurement in highly alkaline solutions, containing sodium ion concentrations of two mols per liter and up to a pH of 12, (3) delicate handling of the electrodes is no longer required, and (4) by improving the electronic measuring circuit and shielding the electrode leads, the effects of stray currents have been practically eliminated. It is not claimed, of course, that the ultimate in pH measurement has been reached, but recent progress has made industrial pH measurement and control possible where heretofore practical considerations seriously limited the applications.

Sturdy construction of electrode assemblies has also been responsible for a wider industrial usage of pH measurement. The flow assembly, illustrated in Fig. 14, can be installed directly in process pipelines. Numerous materials of construction, including porcelain covered iron, rubber, stainless steel, Monel metal, and Pyrex glass, can be used to fabricate the chamber. The immersion assembly designed for permanent installation in tanks, vats, and other process vessels can be operated under pressures of 30 pounds per square inch and over. In this assembly, there are three major parts, namely, the glass electrode, the calomel reference electrode, and the resistance thermometer. The resistance thermometer automatically and continuously compensates for the effects of temperature upon the resistance of the glass in the electrode.

Numerous special electrodes have been developed to satisfy peculiar process conditions. For example, an electrode assembly has been designed which does not expose any metal parts to the process solution. The production of penicillin requires a special electrode which permits the convenient measurement of pH of two liquid layers, a water layer and a chloroform layer. pH measurement is important, since it greatly affects the mutual solubilities of the liquids involved.

While the saturated calomel cell is generally used as the reference electrode, special mercuryless electrodes are available for processes, such as photographic film manufacture, where mercury cannot be tolerated.

ACKNOWLEDGMENTS

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Dr. John V. White, Perkin-Elmer Corporation.

George Herbert Bancroft, Distillation Products, Inc.

T. B. Hetzel, T. J. Stokes Machine Company.

HEADLINERS in the NEWS

MARSHALL DILL, elected vice-president of Witco Chemical Co. coincidental with the consolidation of Witco's Pacific coast activities and the Dill export-import organization.

GEORGE W. MERCK, awarded the Medal of Merit, the nation's highest civilian award, by Secretary of War Patterson, for his direction of the War Research Service.

FOSTER D. SNELL, elected president of the American Institute of Chemists at the annual May meeting. Dr. Snell succeeds Gustav Egloff.

EUGENE P. WIGNER, on leave of absence from Princeton, appointed director of research for Monsanto Chemical's Clinton Laboratories at Oak Ridge.

MAURICE L. TAINTER, appointed director of the recently formed Sterling-Winthrop Research Institute, has also been elected a vice-president of Sterling Drug.

H. A. MERENESS, formerly technical superintendent of the Chicksaw Ordnance Works, Memphis, has joined the Institute of Textile Technology's research staff.

ROBERT P. PARKER, named assistant to M. L. Crossley, research director of Cyanamid's Calco Division. He joined Calco upon his graduation from Ohio State in 1933.

ERNEST H. VOLWILER, executive vice-president of Abbott Laboratories Inc., Chicago, awarded the honorary degree of Doctor of Science by Miami University on June 2nd.

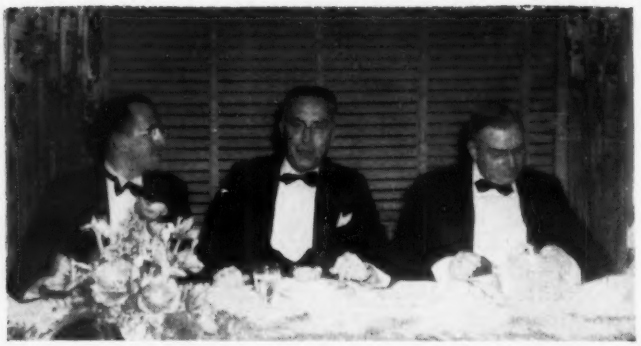
Russell Honored At AIC Convention

Main feature of the A. I. C. convention, held in New York last month, was the presentation of the Institute's annual gold medal award to Robert P. Russell, president of Standard Oil Development Co. and head of the technical and research organization of Standard Oil Co. (N. J.)

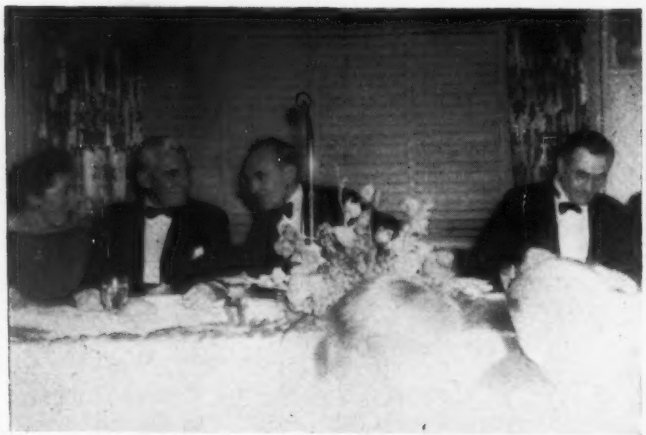
Dr. Russell was so honored in recognition of his abilities as a chemist, engineer, and administrator, and in the light of his contributions to petroleum technology, and particularly, the war effort.

Above, Dr. Russell receives the award from Gustav Egloff, retiring President of the A. I. C. In his acceptance address, Dr. Russell stressed the fact that during the war government, science, and industry worked as a well-coordinated team, and that every effort should be put forth to ensure that such cooperation is not weakened, particularly through legislation inhibiting the full utilization of industrial research facilities.

Major General Alden H. Waitt, chief, CWS and Warren K. Lewis, professor of chemical engineering, M. I. T. eulogized Dr. Russell's accomplishments.



Head table guests at the presentation banquet, left to right: Wallace P. Cohoe, pres. Chemists' Club; Cornelia T. Snell, chairman, N. Y. A. C. S.; L. W. Bass, past-pres. AIChE.; Raymond E. Kirk, A. C. S.; John D. Coleman; Donald Price, vice-pres. A. I. C.; Lloyd R. Van Doren, sec. A. I. C.



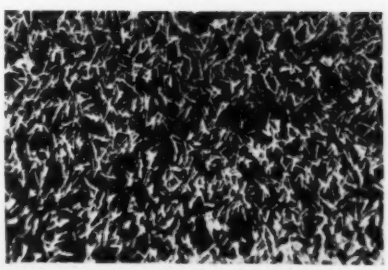
In the conventional order: Mrs. R. P. Russell; Dr. Russell, Gustov Egloff; Warren K. Lewis; Frederick A. Hessel, treas. A. I. C.; Wm. J. Sparks, N. J. A. C. S.; John M. Weiss, AIChE; and Foster D. Snell, president, A. I. C. Dr. Russell spoke on "Science Legislation and the Public Interest."

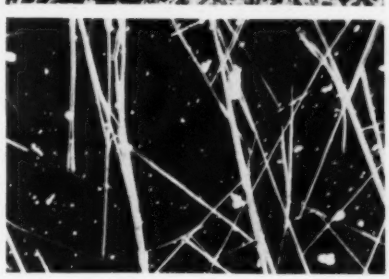
Novel DDT Formulation

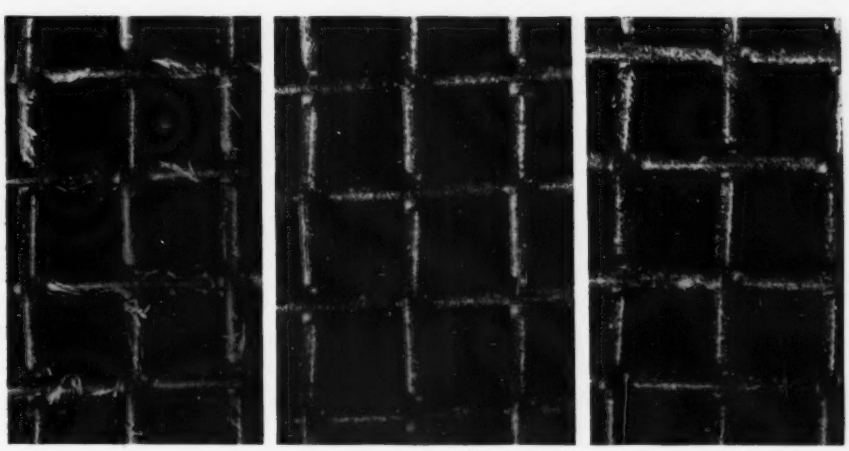
DDT's long-lasting insecticidal value has fostered many investigations concerned with incorporating the toxic chemical in paints. But technical difficulties—mainly the fact that the ideal properties of a durable protective coating are virtually opposite to those required for an insecticide base—have impeded the development of such dual purpose paints.

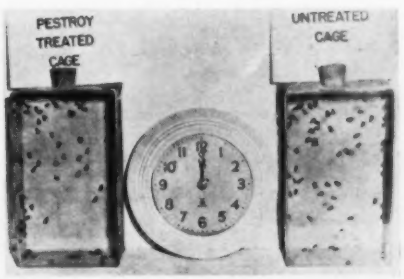
However, a single purpose, lacquer-like composition has been developed by Sherwin-Williams. Containing 6 per cent DDT in a resin base, it may be applied to screens etc. as a clear, non-glossy coating, and according to the company will remain effective for three months indoors: one month outdoors.

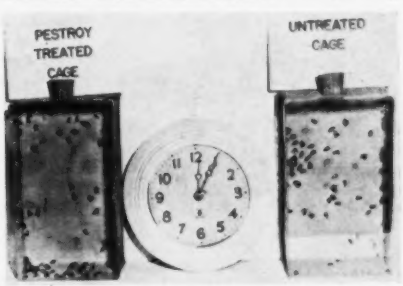
Pictured (below center) are crystals deposited from the resin (upper) and from kerosene (lower). Directly below are photographs of tests cages, treated and untreated, depicting the coating's insecticidal properties.

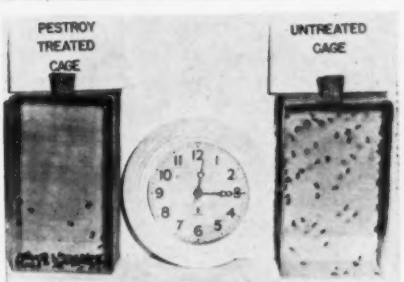


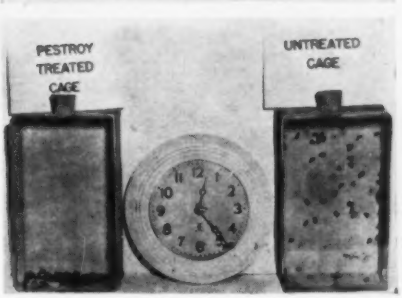








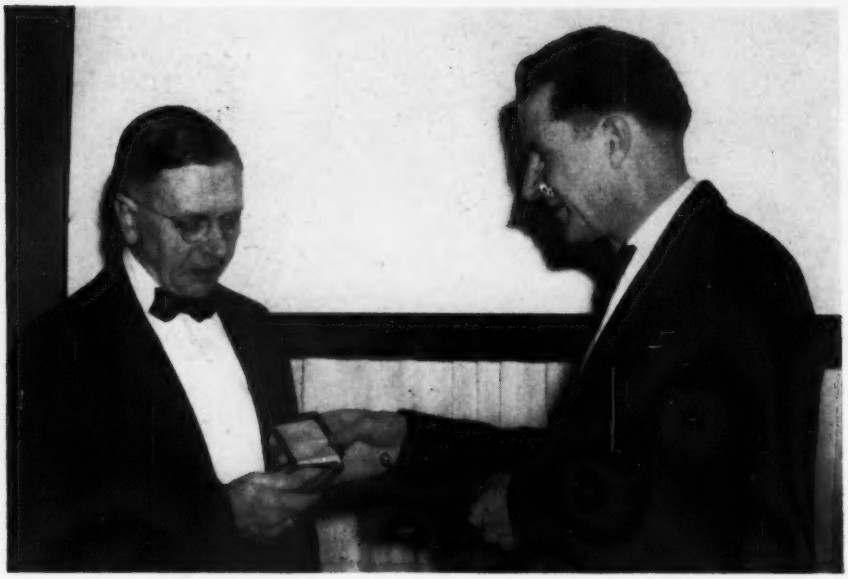


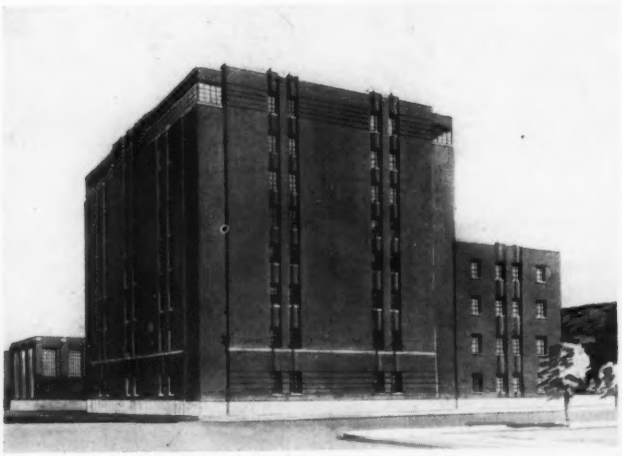


Loosely attached DDT crystals, as deposited from kerosene solution on a screen, are seen at left. In center is a similar resin-applied coating, and at right, a photo taken two months later showing how the DDT has migrated to the surface of the resin.

Medal Award

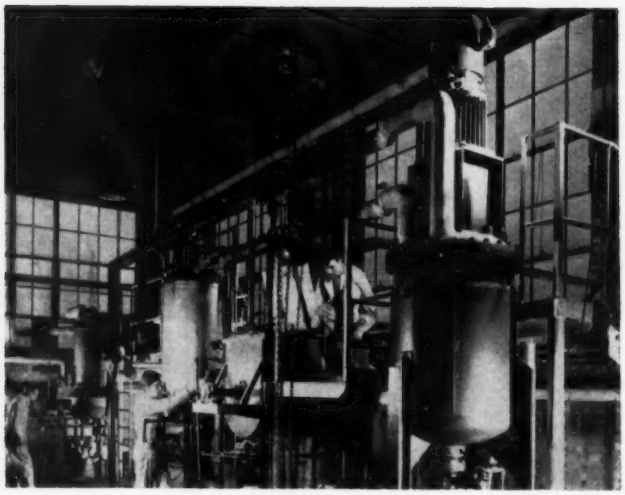
Harvey N. Gilbert of Du Pont, receiving the Jacob F. Schoellkopf Medal for outstanding service to chemistry from Robert A. Fowler, chairman of the western New York Section of the A. C. S. The award was made to Dr. Gilbert, at Niagara Falls, Ont., in recognition of his contributions to the production and handling of metallic sodium and its derivatives, and the development of the sodium hydride process for descaling steel.





New Monsanto Office

Architect's perspective of the eight-story, air-conditioned, office building being erected by Monsanto Chemical Co. It is adjacent to the company's existing offices, and is part of the recently inaugurated three-year, fifty million dollar expansion program.



Witco Builds ↑

Battery arrangement of jacketed mixers and reactors in the new pilot plant built by Witco Chemical Co. adjacent to the firm's Chicago laboratories. Duplicating actual plant equipment on a small scale, the unit will be used in adapting laboratory procedures to production operating conditions. Major emphasis will be placed on the development of asphaltic specialty products.

← Dry Ice Unit

View of the straight line process production presses for the manufacture of solid carbon dioxide installed in the recently completed Belleville, N. J., plant of Liquid Carbonic Corp. The new unit is located near Carbonic's major customer, Walter Kidde & Co., and so designed that liquid carbon dioxide can be piped under pressure directly to the consuming plant.

how can you use this UNUSUAL water-miscible SOLVENT?

(GAMMA VALEROLACTONE)

The wide-range adaptability of this unusual water-miscible solvent suggests that you may be interested in samples for your own experimentation and tests. They will be sent promptly on request, together with technical information.

Monsanto GVL is completely miscible with water and most organic liquids. It is non-irritating and safe for most normal uses — non-flammable at ordinary temperatures — colorless — possesses only a mild odor. Its solvent action does not disappear when mixed with water, but remains present in proportion to its concentration. It is a good solvent for most synthetic resins, films, and fibers.

Note the physical properties and suggested applications of Monsanto GVL — they may indicate new uses to you. Samples and technical bulletin No. OD-104 may be obtained by contacting the nearest Monsanto Office, or writing MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1706 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Cincinnati, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

These Present Applications May Suggest New Uses to You	
Special printing inks	Window-cleaning fluid
Hormone, drugs, essential oil extraction	Manicure-lacquer remover
Adhesives	Anti-blush for lacquers and lacquer thinners
Lithography	
Resin manufacture	
Solvent carrier for special insecticides	Brake fluid
	Dye baths

Chemical and Physical Properties	
Pounds per Gallon	8.75
Boiling Point (760 mm.)	Approximately 206°C. (403°F.)
Flash Point (Cleve. Open Cup)	96°C. (205°F.)
Fire Point (Cleve. Open Cup)	104°C. (220°F.)
Crystallizing Point	Approximately −37°C. (−35°F.)
Viscosity at 25°C.	2.18 Centipoises
pH Anhydrous	7.0
pH 10% solution in distilled water	4.2

BETWEEN THE LINES

Russian and Japanese Phosphates

The position of Soviet Russia in the postwar phosphate trade and the potentialities of former Japanese mandate islands now held by the United States both complicate the world phosphate outlook. A look at the prewar record of these producers offers some interesting background and sidelights.

RUSSIA'S conduct of phosphate export and production activities in the prewar era was strikingly similar in pattern to that government's attitude in international affairs today. Russia has long produced phosphates for domestic use, but in the early 1930's she began exploiting the considerable deposits on the Kola peninsula and entered the foreign trade in phosphates about 1932.

The Russian exports to Europe were characterized by exceedingly low prices. However, the Russians were also anxious to ship on a barter basis and found encouragement in this endeavor in Germany. Buyers in Germany, in fact, used the low Russian price as a club, about 1934, in attempting to beat down the price of other countries' exports.

When in 1935 Russian competition became pressing, various world interests were represented at a meeting, from which was reported a decision to seek some agreement with Russian officials, similar to cartel arrangements then in existence between other interests in the field.

According to the Federal Trade Commission's study on cartel operations, recently completed, this agreement would have encompassed the assignment of a quota to Russian phosphate equivalent to Soviet sales of that time and an annual "indemnity" of $1,000,000.

The Representatives of the Phosphate Export Association, the American organization of phosphate shippers which included both pebble and phosphate rock interests, are reported, however, to have been reluctant to enter into such an arrangement. They proposed instead that engineers be sent to the Russian mines to report on their current and potential output.

Apparently this PEA suggestion was discarded. The Russians were described as making "impossible" demands, meanwhile, for a large share of the world market, and also an indemnity, as their price for entering any agreement. A stalemate resulted. It was then determined by the various other representatives to fight Russian competition. A proposal was considered to drop all cartel arrangements, so as to leave each element free to compete to the fullest extent possible.

Unfair Trade Practices

From the American viewpoint, it probably would have been well if engineers, and particularly Americans, could have gotten a close-up of Russian phosphate operations at the time. There is inferential evidence the Russians were using the American-patented flotation process for recovery of phosphate concentrates without compensation to the patent owners.

Records of the U. S. Tariff Commission, another source of information on the matter, indicate there were certain unfair aspects, such as "dumping", connected with the importation of Russian phosphate to this country but anti-dumping proceedings launched by the Tariff Comission were not sustained by the Court of Customs and Patent Appeals.

Accordingly, the American as well as other markets continued to feel Russian competition right up to the outbreak of World War II. Russian shipments to the European market rose from a proportion of 1.59 percent in the period 1929-33, to 9.59 percent for the years 1934-38, despite active competition from older export sources. Russian competitive practices, coupled with the depression, were an important factor in lowering the world price almost to the disintegration point during the thirties.

The Japanese Islands

Announcement was made recently that an American scientific and economic mission will make a thorough survey of captured Japanese mandate islands during the coming summer As early as 1923, competition from producers of high grade phosphate from the Pacfic Islands is recorded, coming, however, from British-flag areas. It is interesting to note that one of the principal sources of this competition was Christmas island, which is one of those on whosh British and American negotiations have split as to future control. American interests are seeking Christmas and Funafuti, along with the Canton Islands, as a part of a Pacific defense pattern evolved by U. S. military and naval strategists.

Most of the production of these islands, and others in the group, has gone to Australia, New Zealand, and Japan in prewar years. American producers had little chance against this competition. Then Pacific phosphate began also to move to Europe, leading to a move on the part of older shippers to reach an agreement by which the European market would be shared, provided the large Japanese market for phosphates was suitably divided.

This suggestion threatened the favorable position enjoyed by members of the Phosphate Export Association in the Japanese market, however, and this association is stated to have objected, so that no agreement on these lines was developed at the time. An arrangement between major producing interests was, however, made in 1937.

It should be added that negotiations looking to bringing these British-flag islands under permanent American control have struck strong British objections at this writing. Just what would be the position of phosphate producers if the islands are eventually transferred is an interesting speculation. Not so speculative is the situation of the former Japanese mandate islands which the United States occupies, and which admittedly are to be explored for their economic possibilities.

Japan was one of the heaviest phosphate-consuming areas in the world, prior to the war and is stated to have extensively developed the phosphate deposits on the islands that were assigned to Japanese custody after World War I. Production is reported to have increased from 166.000 metric tons in 1935 to 375,000 tons in 1939.

It may be indicative of what will be found on the former Japanese islands that Ocean and Nauru islands, British-owned, in the Gilbert group, which was largely held by Japan otherwise, produce a top grade of phosphate—85 to 88 percent bone phosphate of lime, with less than 1 percent of iron and alumina. The same high grade is found on French-owned Pacific islands, and incidentally on Christmas island.

Japan and the mandated islands formerly controlled by that country are jointly credited with an estimated 28,984,000 metric tons of phosphate rock, which compares with estimated reserves of 50,000,000 tons on Christmas island, and 282,245,000 tons on Ocean and Nauru.*

In view of Russin's dominant position in Asia today, it may be significant that the only substantial exploitation of Asiatic deposits, so far has been in the former Japanese-held islands. What the mainland of Asia may offer is for the future to determine.

* Over one-half of the total phosphate reserves of the world are believed to be in the United States, with most of the remainder in North Africa and Russia. Large deposits lie in Canada, Mexico and Brazil, but they have not been worked extensively.

AN IMPORTANT PLUS FEATURE...

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FROM THE NEW "PERPETUAL" CATALOG OF

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One important plus feature of Victor's new chemical catalog you'll probably welcome are the extra data sheets available for convenient filing in various departments of your business. Each data sheet, in standard 8½" x 11" size, covers a related group of products for quick, easy cross-reference of properties.

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If you haven't already requested your copy of this new catalog of Victor Chemicals a personal memo on your business stationery will bring it to you promptly. Extra data sheets can be selected and ordered later as desired.

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Acids . . . formic, metaphosphoric, oxalic, phosphoric, polyphosphoric.
Formates . . . aluminum, sodium, sodium boro-.
Metaphosphates . . . aluminum, ethyl.
Orthophosphates . . . ammonium, calcium, iron, magnesium, potassium, sodium.
Oxalates . . . calcium, sodium.
Phosphorus . . . (yellow)
Ferrophosphorus
Phosphorus Compounds . . . chlorides, pentoxide.
Pyrophosphates . . . calcium, sodium acid, sodium iron, tetrapotassium, tetrasodium.
Sulphates . . . magnesium, sodium aluminum.
Wetting Agents

NEW PRODUCTS & PROCESSES

New Colors For Aluminum NP 321

Aluminum items matching the color of decorative schemes are now possible as the result of developments in electrochemical finishes which make it possible to dye the metal any desired hue from pastels to the brightest of primary colors.

These new aluminum colors, in addition to every other type of finish for the metal have been introduced by the Aluminum Company of America.

A special finish can be applied to aluminum, making it possible to dye the metal in much the same manner as cloth fabrics are dyed. As a result aluminum holds almost limitless decorative possibilities for both exterior and interior use and for home furnishings. Color is imparted to the metal by first treating it in a special electrochemical bath and then dipping the aluminum into a vat filled with dye. The metal may also be colored by using different abrasives during a sand blasting treatment, which gives a uniform matte finish.

Textile Resin NP 322

A textile treating resin which imparts a crispness to cotton fabrics eliminating the necessity for starch in such garments as women's house dresses, children's play clothes and shirts has been announced by the United States Rubber Company.

Now commercially available to textile finishers, the new treatment called Kandar is applied at the time of manufacture. Garments will be bought with the resin already applied. Despite repeated launderings and dry cleanings, the finish will not wash out of the fabric but will remain to restore its newness and crispness after each washing and ironing, U. S. Rubber scientists state.

The treatment can also be used on rayon fabrics to give them better drape and fullness. A rayon blouse or dress will drape, shirr or gather better because of the new treatment.

Light-Weight Cellulose Acetate NP 323

Cellular cellulose acetate, "CCA" for short, is a new plastic envisioned for use as the strong, lightweight cores in airplane floor panels, tail assemblies and wing structures, and in refrigerators, luggage and sections of prefabricated houses.

Lighter than cork, this new plastic combines insulation against heat and cold with its remarkable structural strength when bonded between two sheets of metal. wood, or plastic.

The plastic has excellent compressive strength. When bonded between two panels of metal, wood, or another plastic, it will not be compressed or squeezed except under extreme pressure. Furthermore, the thin sheets of metal, wood or plastic, which would themselves ordinarily bend under load are effectively supported by this strong core of plastic.

The thermal insulating properties of cellular cellulose acetate are virtually the same as those of cork, balsa wood, and other rigid insulating materials. However, the plastic is lighter than balsa or cork, and an equal weight of the plastic interposes a barrier to thermal changes that is much more effective.

The plastic is now made in strips 3.5 inches wide, ⅝ inch thick, and of any desired length. Thicker and wider strips will be made soon. The strips may be readily glued together with thermo-setting adhesives to form thick sections. Llkewise, the plastic may be bonded with ease to metal, wood, or another plastic. Aluminum, magnesium, steel, and stainless steel are among the metals that may be bonded to cellular cellulose acetate.

The plastic may be tooled or shaped with any woodworking machinery. It will be made in four ranges of density—four to five pounds per cubic foot, six to seven pounds, seven to eight pounds, and eight to nine pounds.

Cellular cellulose acetate is now produced in experimental quantities in a semiworks at the Arlington, N. J., plant of Du Pont's Plastics Department. Additional production facilities are scheduled to be ready at Arlington about August 1.

Rustproofer For Steel NP 324

Calgon, Inc., has announced a new low-cost rustproofing technique for steel and galvanized steel, known as the Banox process, which not only will protect metal

during the manufacturing stages but permit a tighter bond with paints, and give it longer life through greatly enhanced corrosion resistance.

The basis of this new chemical process is a flexible, glassy metal phosphate coating, so plastic that it will bend with the steel or permit die-stamping without harm to the coating. The coating, which has a thickness of from 5 to 15 millionths of an inch, may be put on by the spray, immersion, or brush methods. It requires no heat.

The process promises great improvements in the finishing of automobiles, refrigerators, gas and electric ranges, deep-freezing units, stokers, household appliances, and other metal articles. Greater finish durability and a longer service-life to the ultimate customer is assured.

Fiberglas Packing Desalts Oil NP 325

Progress in the development of a new process for removing from crude oils the inorganic salts that have a corrosive effect upon refining equipment has been described by C. G. Kirkbride, professor of chemical engineering, A. and M. College of Texas, and T. A. Burtis, research fellow.

Pilot plant test runs have proved the

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (6-6)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 321	NP 325	NP 328	NP 331
NP 322	NP 326	NP 329	NP 332
NP 323			NP 333
NP 324	NP 327	NP 330	NP 334

Name ..... **Position** .....

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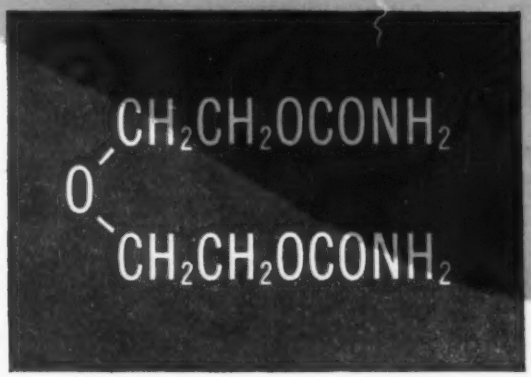
Columbia's Technical Staff

presents

the organic compound

Diglycol Carbamate

(DIETHYLENE GLYCOL DICARBAMATE)



Diglycol Carbamate is a white crystalline organic compound containing two carbamate groups. It is relatively insoluble in common organic solvents, but is soluble in water and polyhydroxylic solvents upon heating. It is relatively stable to acid hydrolysis, but is less stable to basic conditions.

Diglycol Carbamate condenses with formaldehyde to produce tough, colorless resins. Typical castings possess flexural strength values as high as 22,000 psi., and unnotched Izod impact strengths up to 10 ft. lbs. per inch. Water absorption values are apparently slightly higher than for similar urea resins.

Diglycol Carbamate co-condenses in urea-, melamine-, and phenol-formaldehyde resins, and may be used to modify these resins for improvement of properties such as flexibility and strength.

DATA AVAILABLE ON REQUEST—*Physical properties and specifications are available on request. If the description indicates potentials in which you are interested, please request samples on your company letterhead.*

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Soda Ash • Caustic Soda • Liquid Chlorine • Sodium Bicarbonate • Pittchlor (*Calcium Hypochlorite*) • Silene EF (*Hydrated Calcium Silicate*) • Calcium Chloride • Soda Briquettes (*Iron Desulphurizer*) • Modified Sodas • Caustic Ash • Phosflake (*Bottle Washer*) • CalceneT (*Precipitated Calcium Carbonate*)

New Products and Processes Index Volume LVIII, January-June, 1946

Alkyd for white enamels ... 296
Imide-modified ... 808
Alkyl phosphate speed nylon processing ... 298
Aluminum chloride catalysts ... 294
coating ... 446
New colors for ... 992
Anodizing magnesium alloys ... 295
Antimalarial ... 295
Arc-welding compound ... 300

Baking enamel ... 294
Board, Insulating ... 808
2-Bromothiophene ... 808
1,2,4-Butanetricarboxylic acid ... 447

Calcium hypochlorite ... 442
ε-Caprolactam ... 294
β-Carboxyadipic acid ... 447
Carpet detergent ... 447
Catalyst, $AlCl_3$ ... 294
Textile resin ... 813
Cellulose acetate, Cellular ... 992
Cellulosic stabilizes fabric ... 614
Ceramic material ... 86
Cleaner, Emulsion, for metals ... 448
Coating, Aluminum ... 446
Concrete form ... 448
Corrosion-resistant ... 82, 610
enamel, White ... 86
Plastic ... 84
Resin, Furane ... 994
Combustion scale remover ... 1001
Concrete form coating ... 448
Construction material, Plastic-like ... 610
Corrosion-resistant coating ... 82, 610
Cotton, Silica improves strength of ... 810
Cyclohexanone oxime ... 294

DDT formulation ... 86, 294
Depressant, Pour point ... 82
Descaling Compound ... 84
Detergent ... 82, 808
for carpets ... 447
Dye, Plastics, Black ... 86
Wool ... 614

Emulsifying agent ... 294
Enamel, Baking ... 294
Porcelain ... 445
stripper ... 442
White, Alkyd ... 296
White coating ... 86
Ethyl silicate ... 812
Evaporator scale preventive ... 612
Evaporators, Descaling of ... 84

Fabric, Cellulosic stabilizes ... 614
Fiberglas desalts oil ... 992
mat reinforces plastics ... 610
Film, Vinyl ... 84
Flooring, PVC ... 812
Fluorescent test for uranium ... 86
Fluorine removed by resins ... 296
Foam preventive, Silicone ... 812
Furane coating resin ... 994

Gels, Silica, Indicating ... 614
Glass-reinforced plastic ... 445
Glaze, Resin, for chintz ... 445
Glue, Resin, for padding ... 810
Fortified ... 448
Greases, Silicone ... 298
Grinding fluid ... 997

n-Heptane ... 812
High frequency destroys mold ... 298
Hydrogen peroxide ... 82, 610
Hypochlorite of lime ... 442

Imide-modified alkyds ... 808
Impregnation with PVC ... 442
Ion-exchange resin ... 810
Ion-exchange resins remove F^- ... 296
Insecticide concentrate ... 296
DDT ... 86, 294
Insulating board ... 808
Iron sulfates process ... 300
dl-Isoleucine ... 612

Lacquer and paint, Recovery of ... 446
Lacquer resin ... 614
Laminating resin ... 444
Leather, Simulated ... 296
Luminescent methyl methacrylate ... 1001

Magnesium alloys, Anodizing ... 295
Utilization of waste ... 997
Metachloridine ... 295
Metal chelates in oxygen process ... 610
Metallic soaps, Water-dispersible ... 812
Metals, Emulsion cleaner for ... 448
Surface preparation of ... 442
Methionine ... 997
Methyl methacrylate, Luminescent ... 1001
Milk, HgO_2 used to purify ... 610
Mold, High frequency destroys ... 298

Nitrocyclohexane ... 294
Nonaethylene glycol mono-cleate ... 294
Nylon processing speeded by alkyl phosphate ... 298

Oil, Desalting of ... 992
Pour point depressant for ... 82
Oxygen process ... 610

Padding glue ... 810
Paint and lacquer, Recovery of ... 446
Paint, Wall, Water-mix ... 612
Paper, Wet-strength, Resin for ... 612
Pearl polymerization ... 999
Phenolic varnish resin ... 86
Photographic silver recovery ... 808
Phosphate, Alkyl, speeds nylon processing ... 298
Phosphate glass scale preventive ... 612
Phosphorescent plastics ... 296
Plaster-plastic ... 444
Plastic coating ... 84
Cellular ... 992
film, Vinyl ... 810
flooring, PVC ... 812
Glass-reinforced ... 445
Luminescent ... 1001
Sealing ... 284
Structural ... 813
Polystyrene ... 997
Plastic-like construction material ... 610
Plastic-plaster ... 444
Plasticizer ... 447
Plasticizing oil ... 612
resins ... 84
Plastics dye, Black ... 86
Fiberglas mat reinforces ... 610
Pearl polymerization of ... 999
Phosphorescent ... 296
Plating, Zinc, Aid in ... 612
Plywood resin, Pre-catalyzed ... 445
Polymerization, Pearl ... 999
Polystyrene, Modified ... 997
Polyvinyl chloride flooring ... 812
impregnation ... 442
Porcelain enamel ... 445
Pour point depressant ... 82

Quaternary ammonium compounds ... 296

Recovery of paint and lacquer ... 446
Resin, Furane coating ... 994
glaze for chintz ... 445
glue for padding ... 810
Ion-exchange ... 810
Lacquer ... 614
Laminating ... 444
Phenolic varnish ... 86
Plywood, Pre-catalyzed ... 445
Textile ... 992
catalyst ... 813
Wet-strength paper ... 612
Resins, Ion-exchange, remove F^- ... 296
Styrene plasticizing ... 84
Vinyl, Stabilizer for ... 612
Rubber shrinkage preventive ... 999
Wax for ... 294
Rust preventive for steel ... 992

Scale preventive, Evaporator ... 612
remover, Combustion ... 1001
removing compound ... 84
Sealing plastic ... 84
Silica gels, Indicating ... 614
Silica improves cotton strength ... 810
Silicone anti-foam agent ... 812
greases ... 298
Silver recovery ... 808
Simulated leather ... 296
Soaps, Metallic, Water-dispersible ... 812
Softener for textiles ... 296
Stabilizer for vinyl resins ... 612
Steel, Rust preventive for ... 992
Sterilizing compound ... 296
Stripper, Enamel ... 442
Structural plastic ... 813
Styrene resins ... 84
Sulfates, Iron, and sulfuric acid process ... 300
Sulfite liquor, Yeast for ... 448
Surface-active agents ... 82, 294, 447, 612, 808, 810
Non-ionic ... 444

Tanning Agent ... 442
Textile resin ... 992
softener ... 296
Tri-octyl phosphate ... 447
Tubing varnish ... 810

Uranium detection ... 86

Varnish resin, Phenolic ... 86
Varnish, Tubing ... 810
Vinyl film ... 84, 810
resins, Stabilizer for ... 612

Water-mix wall paint ... 612
Wax for rubber ... 294
Welding (Arc-) compound ... 300
Weld spatter eliminator ... 295
Wetting agent ... 810
Non-ionic ... 444
Wool dye ... 614

Yeast process ... 448

Zinc plating aid ... 612

process to be effective, and it appears to be applicable to commercial production from an economic standpoint, according to the authors of the paper. Essentially, the process consists of washing the crude oil with water at a temperature in excess of 250 degrees, Fahrenheit; passing the oil and water through beds of fine glass fibers to coalesce the emulsified water; and separating the desalted oil from the aqueous phase.

It has been found, the authors state, that salt content can be reduced to less than 5 pounds per 1000 barrels of oil by proper control of temperature, superficial velocity, density of the Fiberglas beds, and total depth of the beds. The oils employed in the test runs ranged in average salt content from 65 to 272 pounds per 1000 barrels.

There has long been a huge available supply of oil in certain fields, notably West Texas, but refiners have been reluctant to take this crude because it has both a high salt content and a high sulphur content. Corrosion of refining equipment by inorganic salts is particularly severe if the sulphur content is also high. Consequently these oils have suffered a price penalty.

Development of an inexpensive process for removing the salt content would tend to reduce materially the price penalty on these oils.

Furane Resin Surface Coating NP 326

In response to many inquiries pertaining to the use of furane resins as a surfacing agent upon porous bodies such as concrete, wood, composition boards, plaster, etc., the Furane Plastics and Chemicals Company has developed a surface coating grade of furane resin.

This liquid resin is activated with a small amount of catalyst after which it may be spread upon various types of surfaces. Because of its high solids content, surface imperfections and defects in wood, concrete, etc., are concealed. The coating dries to the touch in approximately one-half hour after application and sets quite hard over night. The new furane resin surface coating is characterized by the following outstanding features:

1. Substantially complete resinous coating with negligible volatile material present.
2. Thermosetting plastic capable of drying in the air within a few hours.
3. Very heavy deposit may be laid in one brush coat, tending to hide surface defects, scars and scratches on relatively porous materials.
4. Complete chemical inertness to acids, alkalies, solvents and water.
5. Provides a black, high gloss coating which will stand much weathering.

Typical applications suggested for furane resin surface coating are: finishing and sealer coat for wood patterns; coating agent for laboratory table tops such as

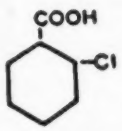
Dependable Chemicals by HEYDEN

FINE HEYDEN CHEMICALS

Chlorinated Benzoic Acids

Intermediates for the preparation of anti malarials, dyes, fungicides, pharmaceuticals and other organic chemicals.

ORTHO CHLOR BENZOIC ACID



High melting, nearly white, coarse powder

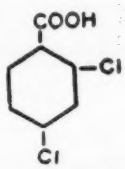
Molecular Weight 156.5
Assay (dry basis) 98.5%
Ash (maximum) 0.20%
Melting Point (minimum)..137.0°C.

PARA CHLOR BENZOIC ACID

High melting, nearly white, coarse powder

Molecular Weight 156.5
Assay (dry basis) 98.5%
Ash (maximum) 0.30%
Melting Point (minimum).....238.0°C.

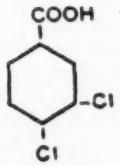
2, 4-DICHLOR BENZOIC ACID



White to slightly yellowish powder

Molecular Weight .....191.
Assay (min. on dry basis).....98.0%
Ash (maximum) 0.20%
Melting Point .....158-162°C.

3, 4-DICHLOR BENZOIC ACID



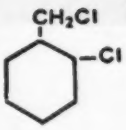
White to slightly yellowish powder

Molecular Weight .....191.
Assay (min. on dry basis).....95.0%
Ash (maximum) 0.20%
Melting Point .....205-207°C.

Chlorinated Benzyl Chlorides

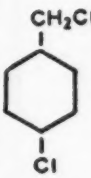
An intermediate for the preparation of organic chemicals, pharmaceuticals and dyes.

ORTHO CHLOR BENZYL CHLORIDE



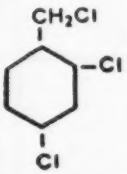
Appearance .....colorless liquid
Molecular Weight 161.08
Assay (minimum) 98.0%
Boiling Range (Typical)
216.0°C. to 222.0°C.

PARA CHLOR BENZYL CHLORIDE



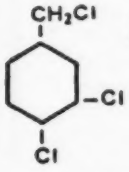
Appearance .....colorless liquid
Molecular Weight 161.08
Assay (minimum) 97.0%
Boiling Range (Typical)
218.0°C. to 230.0°C.

2, 4-DICHLOR BENZYL CHLORIDE



Appearance .....colorless liquid
Molecular Weight 195.5
Assay (minimum) 97.0%
Boiling Range (Typical)
245.0°C. to 252.0°C.

3, 4-DICHLOR BENZYL CHLORIDE



Appearance .....colorless liquid
Molecular Weight 195.5
Assay (minimum) 96.0%
Boiling Range (Typical)
255.0°C. to 260.0°C.

Samples and technical data sheets available upon request

FINE HEYDEN CHEMICALS

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How much is waste costing in YOUR plant?

Here's how you can reduce it with BECKMAN pH CONTROL

IN industry after industry Beckman pH Control is reducing costs, minimizing waste, saving time and greatly increasing production efficiencies. Have *you* investigated what this amazing new profit tool can do in your plant? *Wherever there's water, there's pH.* So if you use water or water solutions of *any* kind . . . whether in pulps, liquids, or semi-solids—in process solutions, waste disposal or any other way . . . chances are that Beckman pH Control can help you do the job better—*for less.* Here, for example, is how others are slicing costs with Beckman equipment . . .

BECKMAN IS THE ONLY HIGH TEMPERATURE—HIGH pH EQUIPMENT

★ An important point to remember when installing pH control in your plant is that there is only ONE make of modern glass electrode pH equipment which can be used *continuously* in high temperature solutions. Even in boiling hot solutions, *Beckman High Temperature Glass Electrodes* give uniform accuracy and long life. This advancement is particularly useful in many food processes . . . in boiler feedwater conditioning . . . and in a wide range of chemical processing operations.

★ Beckman is also the *only* modern glass electrode equipment with which you can make high pH measurements *even in the presence of sodium ions* . . . a development that has extended the usefulness and accuracy of the glass electrode to many new industries where alkaline solutions, in combination with sodium ions, heretofore presented difficulties. A few of the many fields in which this Beckman development has proved indispensable include soap making, the manufacture of bleaches, detergents, etc.

SAVING CHEMICALS: By Beckman-controlling processes where chemicals are used, operations can be controlled so closely that overdosage and excess use of chemicals can be practically eliminated. Not only does this cut chemical costs, but it also assures more uniform processing, more accurate production control and greater plant efficiency.

REDUCING CORROSION: More and more plants are discovering the many advantages of reducing corrosion with Beckman pH Control. By Beckman controlling-process operations, these operators are able to regulate acidity and alkalinity—and thus neutralize excessively corrosive solutions before they damage costly plant equipment.

MINIMIZING REJECTS: Beckman pH Control is also making important savings by assuring more uniform quality of production. In many operations only a small change in pH makes a great difference in operation of the processing solutions. By Beckman-controlling the solutions, run after run is processed with identical quality, thus reducing rejects, cutting production costs and making greater savings in over-all efficiency.

SAVING TIME: Just as heat can frequently speed up chemical processes, so proper pH control can often save on processing time. Here again, even a relatively small saving on each production run quickly builds up to tremendous over-all savings in labor and plant overhead.

WHEREVER THERE'S WATER, THERE'S pH!

Let our engineering staff study *your* particular pH problem and make recommendations on the type of equipment best suited to your requirements. No obligation, of course.

For helpful information on pH control, send for this free booklet "What Every Executive Should Know About pH!"

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Masonite; impervious, water-repellent coating for wood, ceramics, and wallboards; excellent mold release agent when applied to dried plaster surfaces.

Unlike the low viscosity, impregnating resins developed by Furane Plastics and Chemicals Company, the furane resin surface coating is designed to lay on the surface with a minimum of penetration.

Utilization of Magnesium Wastes NP 327

Keeping step with swiftly-moving trends in the use of light-weight magnesium metal, the Bureau of Mines has investigated the utilization of foundry wastes and developed efficient methods for recovering large percentages of magnesium from fine dusts and from the skimmings and leavings of melting and refining pots.

Heavy demands for magnesium metal during the war, together with the fact that a great deal of the metal was lost in processing, prompted the Bureau to work on metallurgical processes for adding scrap-pile magnesium to the limited volume of ingots being produced.

In wartime plants where magnesium was used in airplanes and in the manufacture of incendiaries and pyrotechnics, producers and foundrymen reported that scrap or wasted material amounted in some instances to about 35 per cent of the weight of the finished products.

Results of the Bureau's investigations are reported in a publication written by O. C. Garst, engineer in charge of the Waste Metals Project at the Bureau's Eastern Experiment Station, College Park, Md. This report includes data on tests in the treatment of melting-pot drosses and foundry dusts, flow sheets and related information.

In discussing finer dusts, the publication recommends that magnesium grindings be destroyed instead of processed because of the ignition hazards and the high costs that are involved. Non-metallics removed during the treatment of magnesium dross, the article states, possibly can be utilized in fertilizers for their potash and magnesia content.

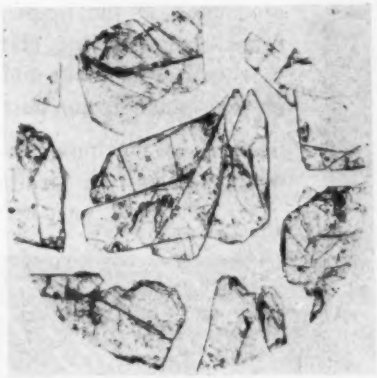
Grinding Fluid NP 328

A new water soluble grinding fluid for use with the Quaker microgrind process has been announced by Quaker Chemical Products Corporation. The new fluid, designated as Quaker Microgrind 70, can be employed with excellent results on abrasive operations on all types of steel and most other metals. It is claimed that the product cannot develop rancidity or odors, even when mixed with extremely hard water or when used for grinding cast iron, and can be used for three months or longer without change if make-up is added periodically. It is further claimed that the product cannot cause build-up on machines but will actually help to keep them clean.

Microgrind 70 is supplied as a practically odorless, pink colored, low-viscosity liquid which instantly forms a true solution with water of all hardnesses. In common with other Microgrind fluids, it has a highly detergent action on abrasive wheels which causes them to be kept open and free-cutting.

Methionine Synthesis NP 329

A new commercial process for synthesizing one of the essential amino acids has been announced by U. S. Industrial Chemicals, Inc. The amino acid, methionine, is one of the ten amino acids considered essential for growth of man and



animals. Recent research reports indicate wide medical application of this chemical, particularly for treatment of the liver.

Methionine has previously been available only in minute quantities and at a cost of several hundred dollars a pound. The new U. S. I. process, Mr. Haskell said, should reduce the cost about 97 per cent and make methionine available for the number of important medical uses which are already known and for many others now under study. The illustration shows a photomicrograph of methionine crystals.

In the past, experimental quantities of methionine have been produced from the organs of sheep and cattle and by high-cost, small-scale laboratory processes. The new synthetic, which possesses all the properties of the natural product is being made in U. S. I.'s Baltimore plant and is being supplied only to drug and pharmaceutical manufacturers. It is pointed out that amino acids of all types should be administered under professional medical supervision.

Modified Polystyrene Molding Powder NP 330

A thermoplastic injection molding powder, which is a modified polystyrene, is announced by the Rohm & Haas Company. Known as Plexene M, this new powder is intended for use at temperatures above the heat distortion point of unmodified styrene compounds or of Plexiglas, the company's acrylic plastic.

Superior to ordinary polystyrenes in weathering properties and in resistance

IN THE CHEMICAL INDUSTRIES IT'S SARAN PLASTIC PIPE, TUBING AND FITTINGS "By Commercial"

A typical installation of Saran plastic tubing that shows its extreme flexibility and fatigue strength.

Part of an installation of Saran plastic pipe that shows some of the standard fittings available.

There are few, if any, industries, that could not save time, trouble and money by installing Saran plastic pipe and tubing for those piping systems for which it is so peculiarly well fitted to perform an efficient and lasting job. Consult our Engineering Department or write for Catalog No. CH 46.

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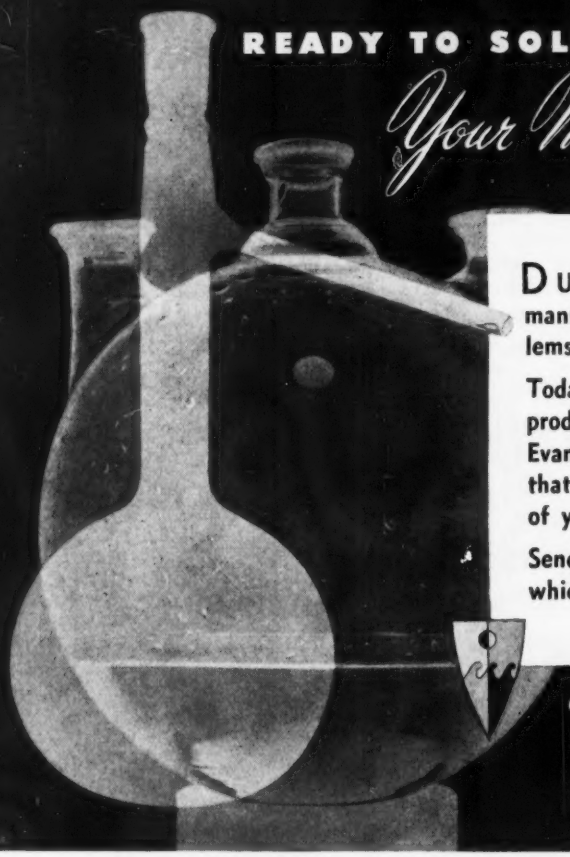

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ANTIPYRINE SALICYLATE, N. N. R.
BETA NAPHTHYL BENZOATE, N. N. R.
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BENZYL DISULFIDE
CALCIUM IODOBEHENATE, U. S. P.
CALCIUM LEVULINATE, pure
CAMPHOSULPONATES
CAMPHORIC ACID, C. P.
ETHYL CHAULMOOGRATE, U. S. P.
METHENAMINE ANHYDROMETHYLENECITRATE
HEXAMETHYL — DIAMINOISOPROPANOL-DI-IODIDE Quaternary Ammonium Compound (chemical name for Endoiodin and Iodisan)

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PALMALENE

A NEW PALM FATTY ACID OF MEDIUM TITRE, SYNTHETICALLY MADE

Palmalene's specifications (see below) make it suitable for many uses. It is excellent as a replacement for Stearic Acid in rubber compounding; and is especially suitable for textile specialties, soap making, alkyl resins, wetting agents, cosmetics, kier assistants, driers, pulp manufacture and paper manufacture.

PALMALENE SPECIFICATIONS

Saponification Number	180-185
Iodine Value	55-60
Titre	35

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to chemicals, Plexene M also has improved machining qualities. Moldings made with this new material do not show the marked tendency to crazing characteristic of many unmodified styrene compounds.

In molding, Plexene M requires slightly higher cylinder temperatures than styrene formulations and best results are obtained in the 430°-480° F. range, using medium to high molding pressures.

Plexene M has a heat distortion temperature which is considerably higher than that of Plexiglas R and of standard polystyrene compounds. Residual strains are lessened by its good flow characteristics; maximum service temperatures of 90° C. (194° F.) should be satisfactory for Plexene M molding except where extreme dimensional stability is necessary.

Like standard styrene, Plexene M has a power factor very much lower than that of Plexiglas, but not as low as unmodified polystyrene. Its arc resistance is superior to styrene.

The natural color of Plexene M is a light amber, and translucent and opaque colors ranging from ivory to black are available.

"Pearl" Polymerization Improves Plastics NP 331

Impurities in the basic materials of plastics, believed to cause present breakage, wear and deficient insulating properties of manufactured articles, should be largely eliminated through the use of the pearl polymerization method which produces a basic plastic material of a high degree of purity, according to Dr. W. P. Hohenstein, research associate in chemistry of the Polytechnic Institute of Brooklyn.

This method produces polymer globules ranging in size from ½ millimeter to 4 millimeters.

Dr. Hohenstein revealed that in recent experiments he has been successful in producing globules of a rubbery consistency. These rubbery materials have been produced uniformly and are essentially free from impurities. This freedom from impurities is of the greatest significance in the many applications where impurities present in the rubber made by other processes commercially are considered the cause of rapid aging of the material. Such rapid aging causes the article to disintegrate.

The process of pearl polymerization in principal, Dr. Hohenstein explained, consists of dispersing a monomer in a nonsolvent medium by mechanical agitation and converting the monomer globules, thus formed, to the polymer under the influence of heat and catalysts.

It is necessary, Dr. Hohenstein pointed out, to avert agglomeration of the globules while, in the course of the polymerization, they pass through a sticky stage. This can be achieved by the addition of small amounts of suspension stabilizers or by adjusting the density and viscosity of the suspension medium in such a way that the massing of the spheres in any particular zone of the reaction vessel is prevented and the number of possible collisions between the spheres is decreased.

Rubber Shrinkage Reduced NP 332

A proved way, and an economical way, of reducing shrinkage in white and colored rubber goods is through the incorporation in the stock of a few per cent of Solka-Floc, according to the manufacturer, Brown Company. Solka-Floc is Brown Company's registered trade name covering a line of fibrous, chemically purified wood cellulose products.

A typical case is claimed to be the use of two parts Solka-Floc BW 40 per one hundred parts rubber in a base stock which exhibited shrinkage of as much as 15 per cent; by this means alone, shrinkage was reduced to a negligible amount with no significant effect on other properties.

Because of its fibrous nature, Solka-Floc may also be used up to 20 parts as a stiffener of rubber compounds, permitting heavier loading.

The Solka-Floc line includes several grades with a wide choice of particle size in each grade, all of which are readily available in quantity. The finer materials, such as Solka-Floc BW 200, find use in latex compounding and in the loading of foam rubber while the longer fibered prod-

BORN OF WARTIME RESEARCH

Although manufacturing facilities have been drastically curtailed during the war period, our research department has been very busy.

Out of this research a great many Aromatic Chemicals have been developed which are of great potential interest to the Perfumer.

Sample quantities of these are available. If you are interested in a new and distinctive note for your product you will doubtless find one or more among these that will be of interest to you.

n-HEXYL SALICYLATE—Is of value in Fougere type odors. It has exceptional floralcy.

ALPHA METHYL CINNAMIC ALDEHYDE—Is used in Jasmin odors, wherever a floral note is desired.

CHERIOL—For use in both flavors and perfumes. It is interesting in wild cherry flavors. It has a woody afternote which makes it attractive in perfumes of many types.

DIASMOL—Is used in Jasmin odors and floral odors generally. It has a green, leafy note which is found in natural Jasmin.

RESEDALIA—A chemical which is present in many well known perfumes. It gives a very interesting and unusual note.

CYCLAMAL ACETAL — An interesting development of this well known product. Fainter in aroma than Cyclamal, it is extraordinarily stable.

ALDEHYDE 3-A—Has a leafy floral note.

KETONE 12-A—Is of value in all types of Violet bouquets, wherever Ionines are used and a special Ionone note is desired.

GLYCIDOL—Is valuable in Walnut and Butter flavors.

LILANAL—Has a leafy rose-note and is an excellent Lily of the Valley base. It is soft and fine.

ROSANOL—A rose leaf note, reminding of Bromstyrol, but very much finer.

2-ETHYL HEXYL SALICYLATE

CYCLOKETAL—Is of value in Russian Leather type perfumes.

b-ETHOXY SALICYLATE

b-ETHOXY ETHYL SALICYLATE

FOLIANOL

n-OCTYL SALICYLATE

n-BUTYL SALICYLATE

VIOLETTONE—A Ketone basis for Violet odors with Patchouly note.

TUBEROL—Basis for Tuberose odors for creams, lotions, etc.

ALDEHYDE FK—Basis for Lilacs to create richer, stronger Lilac odor. Add up to 10% Aldehyde FK

GERANIUM BODY—Enhances the odor of Oil of Rose Geranium. It is exceptionally valuable in soap perfumery. Its value is not apparent until actually tried and age tests are made of the finished product, when it shows to great advantage.

b-METHOXY ETHYL SALICYLATE

ETHYL HEXYL SALICYLATE

FIXATONE—Is a high boiling point fixative for soap perfume.

LILANTHAL—Is of value in all types of Lilac perfume.

JASMINOL—A chemical similar to Alpha Amyl Cinnamic Aldehyde, but very stable. Of much finer odor.

CUIRUSAL—Is an interesting odor for the development of new type perfumes.

SALIXOL—A light, pleasing Cinnamic Willow Bark note. It is of interest both in flavors and perfumes.

CUMINONE—An odor note similar to Cuminic Aldehyde, but much softer and finer.

ACASOL—Of value both in perfumes and flavors.

MUGINOL—For Lily of the Valley type perfumes.

FLORAFAL—Of a floral leafy character.

Requests for samples on your own letterhead will be promptly answered. Write for a list of our full line of Aromatic Chemicals.

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ucts may be dusted onto a prevulcanizate to produce a suede-like finish. Moreover, Solka-Floc can be used in thermoplastic resin compounds, such as the vinyls, with retention of flexibility and considerable extension of more expensive materials.

Compound Removes Combustion Scale NP 333

The Gamlen Chemical Company has announced a product named Gamlenite, which removes hard slag and other combustion deposit from tubes and other boiler metal surfaces, and from furnace refractory walls, by chemical means. Gamlenite is a powder which is blown into the furnace while it is in regular operation. It forms a dense non-poisonous vapor which reaches all parts of the furnace and firesides of the boiler metal. Its use minimizes the necessity for taking the boiler off the line to clean manually.

Gamlenite exerts a unique reducing action, breaking down hard combustion deposit into a soft powder which, for the most part, is carried up the stack by the draft. It also Gamlenizes the boiler metal, which provides maximum resistance against corrosion, and greatly retards reaccumulation of further combustion deposit.

Luminescent Lucite NP 334

New forms of "Lucite" acrylic resin containing luminescent pigments—a fluorescent type which glows when exposed to ultraviolet, and a phosphorescent type which glows in the dark after exposure to ordinary light—have been announced by the Du Pont Plastics Department.

Sheets of Lucite containing phosphors are now being produced on a small scale, the company said, and are being evaluated for night use, both indoors and out. The sheets were shown publicly for the first time at the National Plastics Exposition in New York, April 22-27.

The afterglow of this phosphorescent sheeting is claimed to be outstanding in the field of plastics. After exposure to light, the sheeting gives light of maximum brilliance for a matter of minutes, and then continues for ten or twelve hours to give light sufficient to be seen by an eye adapted to the dark. The fluorescent sheeting, on the other hand, does not necessarily store light, but glows brilliantly while subjected to ultraviolet light.

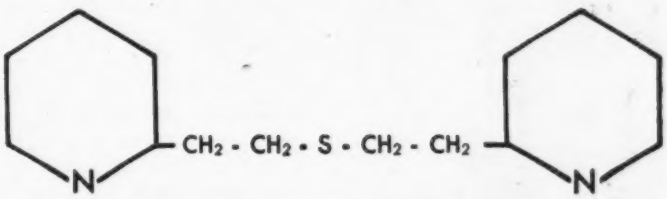
Sheeting of both types is expected to be used in advertising signs. Other potential uses include parts of lamps, baseboards, and panels for light switches used in bedrooms, directional signs of all types, house numbers, Christmas-tree ornaments, dial faces and airplane instrument panels, theater exit signs, parts of radios and television sets, architectural panels, and entire walls and sections for bars.

The sheets can be manufactured in a wide range of colors, in all of the standard sizes of regular Lucite sheeting, and in a range of thicknesses.

REILLY

Presents

Dipyridylethyl Sulfide



PROPERTIES OF THE PURE COMPOUND

Molecular Weight: 244.2

Density: 1.113/25°C.

Index of Refraction: (n 20/D) 1.5841

Readily forms water soluble salts with acids

Solubility: In 100 grams water @ 20°C.: 0.7 g. Solubility of water in 100 g. @ 20°C.: 21.8 g. Soluble in all common organic solvents.

Freezing Point: 1.5°C.

● DIPYRIDYLETHYL SULFIDE is another of the new, interesting and unusual compounds now made commercially available in 95% purity through Reilly research and development.

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A copy of this 56-page second edition and supplementary printing, describing the complete REILLY line of coal tar chemicals, acids, oils, bases and intermediates, will be sent on request.

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Reilly Coal Tar Chemicals For Industry

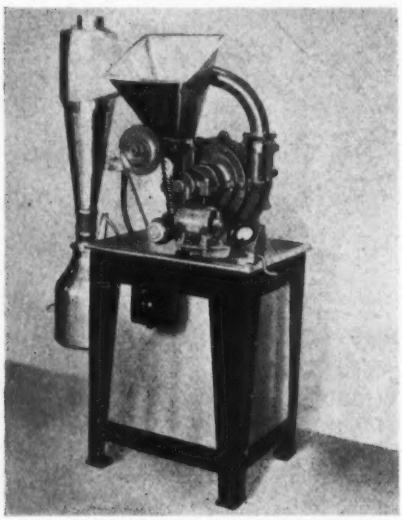
NEW EQUIPMENT

Ultra-Fine Pulverizer QC 842

A new mechanical, dustless, screenless pulverizer, the No. 5 Mikro-Atomizer, especially suited for small quantity production, pilot plant or laboratory work, has been announced by the Pulverizing Machinery Co.

It is exceptionally cool in operation with grinding capacities from 5 to 200 lbs. per hour. It is capable of reductions to ultra-fine particle sizes in the 1 to 25 micron range, powered by a 5 HP motor.

The Mikro-Atomizer operates on an



entirely new grinding principle, that of imparting a centrifugal force to each particle and opposing that force with an aerodynamic drag. The raw material, fed into the mill from the customary hopper, is first pulverized by rotating hammers, then carried by an air stream into a separator wheel whirling at 7,000 to 10,000 RPM.

A fan adjacent to the separator wheel exerts just enough suction to draw out and discharge the finest particles. The coarser particles, increased in gravitational weight by the centrifugal force imparted by the separator wheel, resist the pull of the fan and drop back into the path of the hammers where they are beaten until they yield to the pull of the fan.

All parts in contact with material being ground are 18-8 stainless steel with the exception of body castings which are of a high nickel-iron alloy, or other machineable alloys for special applications.

Flow Meter QC 843

The Bristol Co. announces the addition of a bellows-differential flow meter to its line of mercury manometer flow meters.

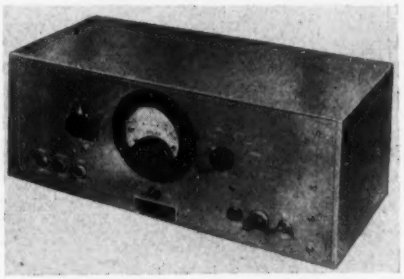
The new instrument, known as the Bellows-Differential Flow-meter, will be made as a mechanical flow meter, as an electric flow meter, and as a pneumatic-transmission flow meter in a complete line of recording, indicating, integrating, and automatic controlling models.

The meter body, operating on a new principle, requires no mercury in its operation. A new method of transmitting bellows motion to the pen arm is employed, which completely isolates the meter-body shaft from the measured fluid.

Frequency Meter And Tachometer QC 844

The latest development of the Communication Measurements Laboratory measures the frequency of AC voltages over the audible frequency spectrum. In conjunction with a new "photo-beam converter," Model 1800 instantly becomes an accurate electronic tachometer for measuring the speed of rotating or reciprocal mechanisms, including those which cannot be subjected to any additional mechanical load. Speeds in excess of one million rpm or cpm can quickly and easily be measured with this instrument. It can also be used to measure relatively slow speeds in the order of 60 rpm or cpm with equal accuracy, by means of a special "frequency-multiplying" disc or similar device.

When Model 1800 is correctly calibrated



at only one point, such as 60% or full-scale meter deflection, its accuracy is better than 1% at full scale and is equally good at 1/10 of full scale and at all other intermediate points, the actual error in any case depending largely on the so-called "decade accuracy" of the indicating meter.

The accuracy of Model 1800, due to its adequate regulation of all critical circuit and tube parameters, is substantially (0.1% to 0.2%) unaffected by line-voltage variations of 105 to 125 volts, by temperature variations from 0°C to plus 70°C, or by high relative humidity.

Vibration rates can be accurately measured with Model 1800 by the application of a suitable pick-up device. Sounds detected by microphones or phonograph pick-ups can readily be checked for frequency or pitch.

Metal Detector QC 845

The RCA Victor Division of the Radio Corp. of America has announced a new electronic metal detector which will "spot and arrest" metal particles of any kind which may be "hiding out" in non-metallic industrial materials.

The reaction set up in the device when metal is present in materials being inspected can be used to trigger a warning device, stop the process, mark the object, or deflect it into a special channel or receptacle for rejects. Objects or materials can be passed through the inspection aperture on an endless conveyor belt or by means of a chute. The device will accommodate conveyor speeds up to 600 feet per minute without impairment of inspection efficiency.

The completely self-contained unit is 43 inches long by 15 inches wide, with an over-all height of 20 inches plus the height of the aperture, which may vary from 4 to 12 inches to meet product requirements.

Unlike magnetic metal detectors, which will react only to magnetic metals such as iron and steel, the RCA device will detect any kind of metal or alloy, includ-

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Please send me more detailed information on the following new equipment:

QC 842	QC 847	QC 852	QC 857	QC 862
QC 843	QC 848	QC 853	QC 858	QC 863
QC 844	QC 849	QC 854	QC 859	QC 864
QC 845	QC 850	QC 855	QC 860	
QC 846	QC 851	QC 856	QC 861	

Name ..... (Position) .....

Company .....

Street .....

City & State .....

Model 4 Portable Handy for Lab Fires

Light in weight, simple to operate, the Kidde Model 4 Hand Portable Extinguisher is especially useful in fighting the small incipient blazes that may break out in plant laboratories, where flammable liquids are frequently used.

The simplicity of operation of the Kidde Model 4 is of special advantage for laboratory personnel, who may not have had as extensive fire-fighting training as the plant workers. With a Kidde 4, it is necessary only to raise the horn, aim the extinguisher at the fire, and pull the trigger.

Full details on the Model 4 are available from Walter Kidde & Company, Inc.

Do your employees KNOW HOW to fight FIRES?

Don't take chances on their knowledge — teach them the sure way... by demonstration. "How to Teach Fire Fighting" tells exactly how to conduct demonstrations — write for your free copy.
Walter Kidde & Company, Inc.
628 Main Street, Belleville 9, N. J.

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HARD-HITTING
FAST-STARTING
EASY-TO-USE
EXTINGUISHER

15 pounds of carbon dioxide —controlled by simple, foolproof trigger grip valve—that's the unbeatable combination you get in the Kidde 15 Hand Portable!

Mail and Phone Orders Filled

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FULL FIRE-FIGHTING RANGE...
INSTANTLY!

The stream from a Kidde Water Extinguisher reaches its full range as soon as the discharge starts—*maintains* its range till extinguisher is empty.

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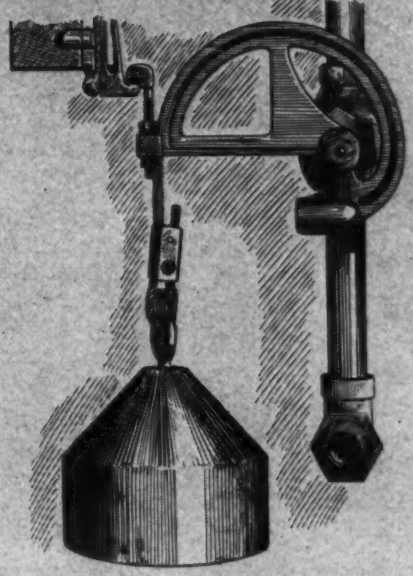

Two-way protection from one bank of cylinders

Put *one* bank of carbon dioxide cylinders on guard over *two* fire hazards, by installing a Kidde built-in system with directional valves. Automatic valves direct the carbon dioxide discharge to the threatened area as soon as Kidde Heat Detectors signal the start of a fire. Manual valves are operated by a simple three-quarter turn. Write for full details.

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

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Firm Rebuked

WASHINGTON, 27.—The

General output at factories and mines decreased 4 per cent in October, while in the first half of November [illegible] basic industries

Meat May Become

stationed in a little town in France for several months, wooed a French girl by telling her about

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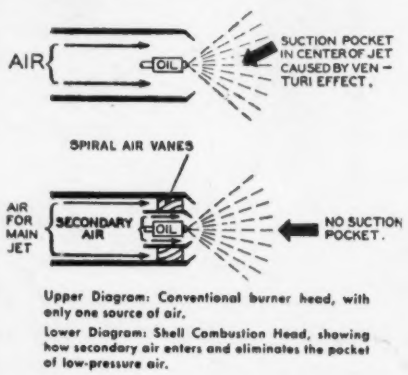
ing iron, copper, brass, lead, aluminum, stainless steel, and others. Ultra-sensitive, it will react to minute as well as larger pieces of metal. Its discrimination can be adjusted to fit conditions for each installation. The reaction is independent of the depth to which the particle may be imbedded in the product being inspected.

In operation, materials passing through the inspection aperture are screened by a high-frequency electromagnetic field, which is generated by coils imbedded in plastic panels at the top and bottom of the aperture. High-frequency power is fed to the coils from a self-contained electronic oscillator, and the reaction caused when metal is present in the material being screened is detected and amplified by a sensitive electron tube amplifier. This amplifier triggers either a signaling device (lamp or bell) or an automatic marking or ejection mechanism, or a combination of these, whichever is desired.

Oil Burner Combustion Head QC 846

The Shell Oil Co. has announced the development of a new oil burner head for gun type burners, enabling perfect



Upper Diagram: Conventional burner head, with only one source of air.

Lower Diagram: Shell Combustion Head, showing how secondary air enters and eliminates the pocket of low-pressure air.

combustion using only 5-10% excess air instead of the usual 150%. In addition, this burner minimizes the problems encountered by the use of the more highly aromatic fuel oils resulting from the increasing use of catalytic cracking, that is, increased smoke and soot formation when the conventional burner design is used.

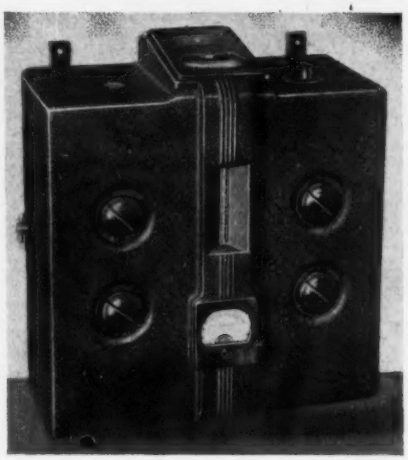
The new head differs from the conventional burner head as shown in the accompanying illustration. Here a secondary air supply is blown on and into the injected cone of oil, which is burning with the primary air supply; the only air supplied in the conventional burner design. No changes have been made in the design of the nozzle which is that used on the conventional high pressure gun type burner. It is further claimed that these changes will result in a fuel saving of up to 20 per cent.

Spray Nozzle QC 847

The service life of vortex type spray nozzles has been increased up to 100 times by incorporating a tungsten carbide insert in the "Whirljet" spray nozzles made by Spraying Systems Co.

Oxygen and Hydrogen Indicator QC 848

Both oxygen and hydrogen impurities in gases may be detected and measured through the new instrument of Baker & Co., Inc. The instrument, known as the Deoxo Indicator, first announced for



determining oxygen impurities has since been further refined and now may also be used for testing and measuring the presence of hydrogen in inert gases, nitrogen, carbon dioxide and hydrocarbon gases.

It indicates the presence of from .001% to 1.0% oxygen impurities, and the accuracy is estimated at ±2% of the range in use at any time. A means of calibrating the instrument is provided.

The presence of small quantities of oxygen is measured in the Deoxo Indicator by the increase in temperature of the gas sample which results from combination of the oxygen impurity with hydrogen.

By introducing an excess quantity of oxygen instead of hydrogen into the sample, the instrument has been modified to detect and measure small quantities of hydrogen impurity in other gases.

Portable Stroboscope QC 849

Model 1210, the newly developed stroboscope of Communication Measurements Laboratory, employs a novel circuit arrangement, using a self-blocking oscillator. Rotary or vibratory motion can be "stopped" when the moving object is examined with stroboscopic light source. The speed covered is from 600 to 48,000 RPM (10-800 cycles per second), in 4 ranges. A synchronized reed is provided for accurate calibration against the line frequency. All 4 scales can easily and quickly be calibrated within ± 3%.

A valuable aid in industry for the slow-motion study of rotating, reciprocating, or vibratory mechanisms, CML 1210 is also useful for studying mechanical stresses and strains under dynamic condi-

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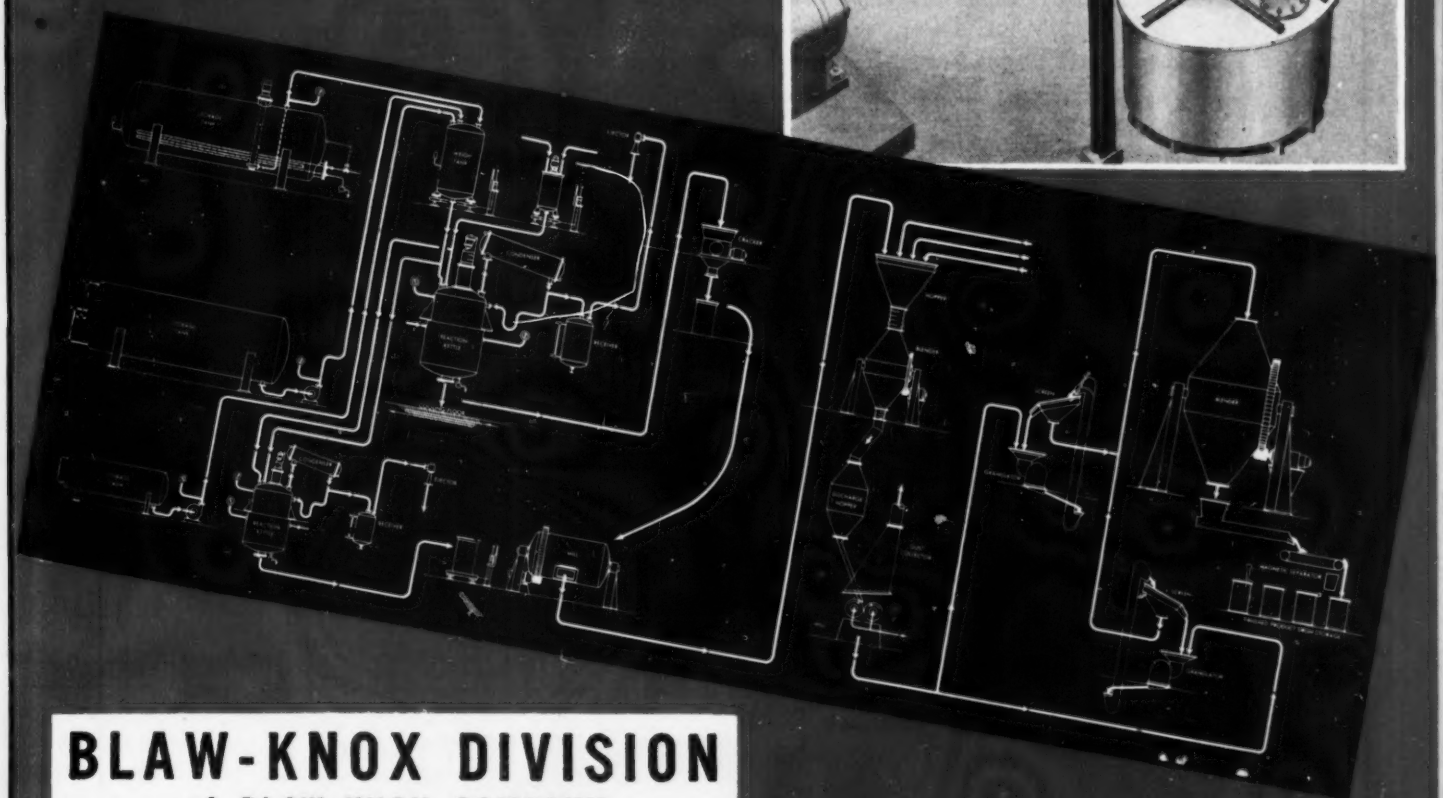
BLAW-KNOX has grown up with the Plastics Industries, collaborated closely with the leading plastics scientists and manufacturers, and is now building the most modern and complete equipment and plants needed in the production of commercial resins — phenolic, urea, melamine, cellulose acetate, alkyd, and vinyl.



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BLAW-KNOX PROCESS EQUIPMENT

New Equipment Index

Volume LVIII, January-June, 1946

Actuator, Automatic Control 624
Adjustable Drive 306
Air Filter 302
Apron 628
Apron Conveyor 616
Autoclave, Laboratory 308
Automatic Control Actuator 624

Barrel and Box Skid 308
Belt Conveyor 96
Box Skid, Barrel and 308
Bulbs, Light 450
Bulk Tank Preheater 96
Burner Combustion Head, Oil 1004

Cab Cooler, Crane 452
Cable Locator, Pipe and 92
Calculating Device 306
Can Hook, Paint 622
Carbon Dioxide Fire Extinguisher 1010
Cascade Cooler 100
Cathode Ray Tube 1012
Chamber, Humidity 96
Check Valve 616, 624
Chemical Feeder 1008
Clamp, Wire Rope 460
Cloth, Diaphragm 616
Combustion Head, Oil Burner 1004
Compound, Pipe Joint 620
Conductivity Cells 100
Continuous Printer 92
Control
  Flow Ratio 462
  Level 1007
  Humidity Recording and 456
  Remote Valve 94
Control Actuator, Automatic 624
Controller
  Current Input 96
  Temperature 302
Conveyor 460, 1008
  Apron 616
  Belt 96
Conveyor Trolley 622
Cooler 304
  Cascade 100
  Crane Cab 452
  Liquid 90
3-Core Solder 624
Counter, Electronic 88, 622
Coupling 616
Cover, Supported Manhole 1008
Crane Cab Cooler 452
Current Input Controller 96

Desk Viewer 92
Detector
  Gas 308
  Metal 1002
Diaphragm Cloth 616
Dielectric Heater 458, 462
Direct Current Motors 98
Drive, Adjustable 306
Dryer,
  Print 618
  Spray 1012
Dryers 454
Duct, Flexible 450
Dust Goggle 92
Dust Trap 1012

Electric Furnace 1014
Electric Immersion Heater 94
Electric Lift Truck 98
Electric Meter 1012
Electric Motor 96
Electronic Counter 88, 622
Electronic Timer 92
Eliminator, Static Electricity 90
Enclosed Motor 1008
Environment Proof Switches 94
Expander Tube 454
Extinguisher,
  Carbon Dioxide Fire 1010
  Fire 101, 628, 630, 632

Feeder, Chemical 1008
Filter, Air 302
Filter and Lubricator 304
Filter Medium, Stainless Steel 624
Fire Control Nozzle 632
Fire Extinguisher 101, 628, 630, 632
  Carbon Dioxide 1010
Fitting, Tubing 306
Flexible Duct 450
Flexible Gear Turret 630
Flexible Tubing 94, 460
Flow Gage 98
Flow Meter 1002
Flow Meter, Indicating 620
Flow Ratio Control 462
Frequency Meter and Tachometer 1002
Furnace,
  Electric 1014
  High Temperature 620

Gage
  Flow 98
  Vacuum 88, 628
Gage Glass Protector 308
Gas Detector 308
Gasket 456
  Pressure Sealed 302
Gasket Replacement Tool 306
Gas Mask and Splash Hood 304
Gas Turbine 618
Gear Boxes, Miter 632
Gear Turret, Flexible 630
Generator, High Frequency Motor 1007
Glove, Work 632
Goggle, Dust 92
Greasing Unit, Portable 98
Grip 92

Hammer, Riveting 462
Hand Trucks 90
Heater
  Dielectric 458, 462
  Electric Immersion 94
  Immersion 620
  Induction 626
High Frequency Motor-Generator 1007
High Frequency Voltmeter 1010
High Temperature Furnace 620
Hook, Paint Can 622
Humidifier 624
Humidity Chamber 96
Humidity Recording and Control 456
Hydraulic Press 101
Hydrogen Indicator, Oxygen and 1004

Immersion Heater 620
  Electric 94
Indexet 304
Indicating Flow Meter 620
Indicator, Oxygen and Hydrogen 1004
Induction Heater 626
Industrial Truck 618
Industrial Wheels 452
Internal Tank Valve 94
Instrument, Stack Analysis 622
Irons, Soldering 306

Jar, Tumbling 460
Jet Pump 616

Labels 460
Laboratory Autoclave 308
Leaks, Plug for Tank 450
Level Control 1007
Lift Truck, Electric 98
Light Bulbs 450
Light, Plug-In Pilot 622
Liquid Cooler 90
Locator, Pipe and Cable 92
Lubricator and Filter 304

Machine, Spot Welding 618
Magnetic Separator 622
  Stainless Steel 90
Manhole Cover, Supported 1008
Marker for Stamping Round Bars 1010
Mask and Splash Hood, Gas 304
Megohm Meter 98
Metal Detector 1002
Metal, Protected 306
Meter,
  Electric 1012
  Flow 1002
  Indicating Flow 620
  Megohm 98
  pH 98
  Valve and Slide 620
Meter and Machometer, Frequency 1002
Miter Gear Boxes 632
Motor,
  Electric 96
  Enclosed 1008
  Direct Current 98
Motor Generator, High Frequency 1007

9% Nickel Steel 302
Nozzle, Fire Control 632

Oil Burner Combustion Head 1004
One-Man Truck 464
Operational Recorder 620
Oxygen and Hydrogen Indicator 1004
Oxygen Recorder 618

Paint Can Hook 622
pH Meter 98
Pilot Light, Plug-In 622
Pipe and Cable Locator 92
Pipe Joint Compound 620
Plug for Tank Leaks 450
Plug-In Pilot Light 622
Portable Greasing Unit 98
Portable Pyrometer 96
Portable Stroboscope 1004
Power Factor Regulator 628
Preheater, Bulk Tank 96
Press, Hydraulic 101
Pressure Reducing Regulator 96
Pressure Relief Valve 100
Pressure Seal Valves 450
Pressure Sealed Gasket 302
Print Dryer 618
Printer, Continuous 92
Protected Metal 306
Protector, Gage Glass 308
Pulverizer, Ultra-Fine 1002
Pump 304
  Jet 616
  Screw 90
Pyrometer, Portable 96

Quantometer 308

Recorder
  Operational 620
  Oxygen 618
Recording and Control, Humidity 456
Regulator
  Power Factor 628
  Pressure Reducing 96
Remote Valve Control 94
Replacement Tool, Gasket 306
Riveting Hammer 462
Rotameter 452
Round Bars, Marker for Stamping 1010

Safety Siphon 632
Screw Pump 90
Separator,
  Magnetic 622
  Stainless Steel Magnetic 90
Siphon, Safety 632
Skid, Barrel and Box 308
Slide Rule 94
Slide Meter, Valve and 620
Small Transformers 452
Solder, 3-Core 624
Soldering Irons 306
Splash Hood, Gas Mask and 304
Spot Welding Machine 618
Spray Dryer 1012
Stack Analysis Instrument 622
Stainless Steel Filter Medium 624
Stainless Steel Magnetic Separator 90
Static Electricity Eliminator 90
Steel, 9% Nickel 302
Stroboscope, Portable 1004
Supported Manhole Cover 1008
Switches, Environment Proof 94

Tachometer, Frequency Meter and 1002
Tank Preheater, Bulk 96
Tank Valve, Internal 94
Tank Leaks, Plug for 450
Temperature Controller 302
Timer, Electronic 92
Tool, Gasket Replacement 306
Transformers, Small 452
Trap, Dust 1012
Trolley, Conveyor 622
Truck,
  Electric Lift 98
  Hand 90
  Industrial 618
  One-Man 464
  Utility 90
Tube, Cathode Ray 1012
Tube Expander 454
Tubing Fitting 306
Tubing, Flexible 94, 460
Tumbling Jar 460
Turbine, Gas 618
Turret, Flexible Gear 630

Ultra-Fine Pulverizer 1002
Utility Truck 90

Vacuum Gage 88, 628
Valve,
  Check 616, 624
  Pressure Relief 100
  Internal Tank 94
  Pressure Seal 450
  Remote Control 94
  Vent 464
  3-Way 1014
Valve and Slide, Meter 620
Vent Valve 464
Viewer, Desk 92
Voltmeter, High Frequency 1010

3-Way Valve 1014
Welding Machine, Spot 618
Wheels 94
  Industrial 452
Wire Rope Clamp 460
Work Glove 632

X-Ray Source 88

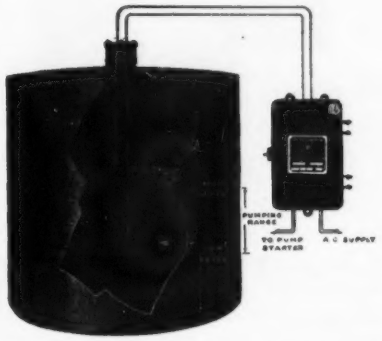
tions and determining their speed or rate.

The light source is contained in a probe attached to a four-foot flexible cable. This unusual feature makes CML 1210 especially useful when using the stroboscopic light in small out-of-the-way places. The light probe and cable are housed in the cabinet when the stroboscope is not in use. The handle of the probe is then used to carry the instrument.

CML 1210 weighs only 19½ lbs. and is housed in a compact cabinet, 10½" x 5⅜" x 10½".

Level Control QC 850

Photoswitch level control Series 10 announces a series of relays for the level control of all electrically conductive liquids. Contact with the liquid is made only by a stainless steel probe rod (there are no floats, bellows seals, or stuffing boxes). With A. C. in the probe circuit, no electrolytic action is possible. Mica insulated probes insure against leakage. According to the manufacturer, this is the only floatless level control containing no vacuum



tubes and operating with low voltage in the probe circuit.

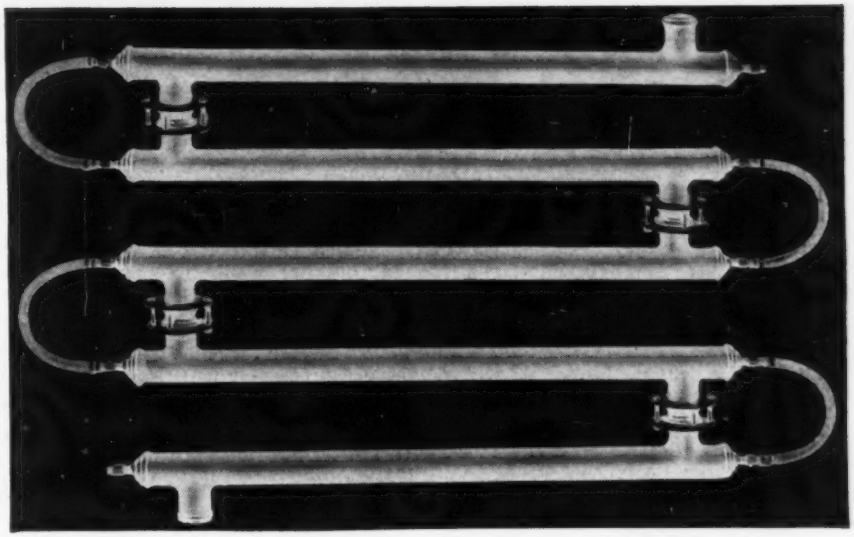
In operation the stainless steel probe rods are suspended into the tank and the liquid to be controlled makes or breaks contact with the probe and transmits a minute electrical current at low voltage to the control.

The contacts are designed for motor starter, motorized, or solenoid valve operation, Arc suppression is supplied on both contacts for increased contact life. The probe circuit will carry a resistance as high as 3500 ohms from 115-230 volts, 50-60 cycles A. C. A single pole, double throw relay is used.

High Frequency Motor-Generator QC 851

The Kato Engineering Co. has recently developed a new compact high frequency motor-generator set. It produces 1000 volt-amperes (watts) at 115-volts A.C. and is especially suitable for railway locomotive use. It is designed to operate from 75-volts direct current.

Voltage regulation is approximately 10% at 60% power factor and approximately 7% at unity power factor with an approximate efficiency of 45 to 50% at unity power factor.



New Unit Heat Exchanger
For Acid Service

The new Knight Heat Exchanger used for heating or cooling acids is built to resist the corrosive effects of any acids or chemicals.

A big advantage is the flexibility of these units. As each unit is a separate, complete heat exchanger, any number of them can be placed in a vertical or horizontal series to give the exact capacity desired. Any unit may be by-passed or a tube replaced in a few minutes without disturbing the other units. All parts of a unit are standardized.

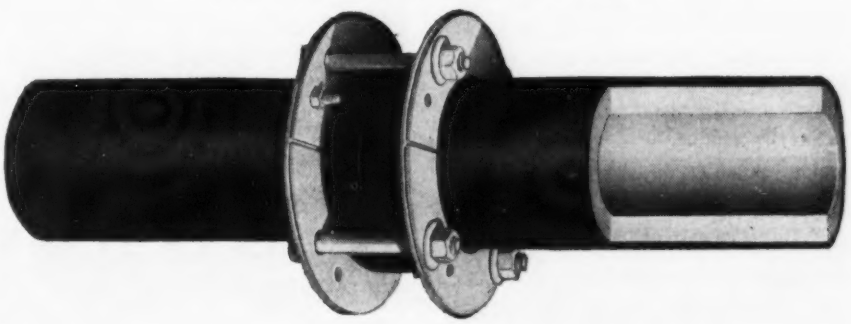
These units in any series are very compact and thus require limited space. One arrangement provides a rack of ten units that is only 6′ long, 21″ wide and 5′ high. A capacity of between 500 to 1000 B.T.U.'s per hr. per F. degree can be secured in liquid to liquid transfer on each six foot unit.

The Knight Heat Exchanger has a heat transfer tube which can be made either of Karbate, Pyrex or Knight-Ware. The exterior shell has optional construction of Knight-Ware or Permanite Armoured Pipe as shown below.

Our engineering staff will be glad to make recommendations on Knight Heat Transfer Units if you will give us data on your problem.

MAURICE A. KNIGHT

206 Kelly Ave., Akron 9, Ohio

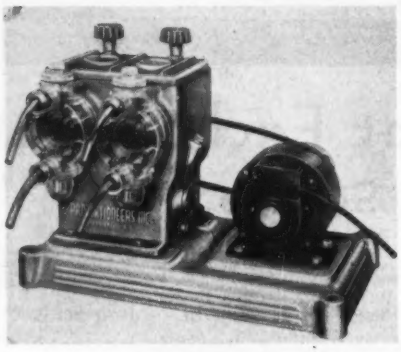


This unit runs on dual set of ball bearings in each end bracket. The removable end covers make D.C. brushes and collector ring brushes easily accessible. It is designed for continuous operation and the commutator of large size with four sets of brushes with surplus cross section for long brush life.

Four poles, 3440 R.P.M., approximately 23 11/16" long by 12 3/8" wide by 13 3/8" high; it weighs approximately 210-lbs. and has a shipping weight approximately 265-lbs.

Chemical Feeder QC 852

The duplex deluxe Chem-O-Feeder, a new chemical diaphragm type proportioning pump delivering chemical reagents in



an almost continuous stream, has just been released for civilian use by %Proportioneers, Inc.%. It is designed for the positive injection of one or two chemicals at predetermined and adjustable rates. The feeding rate of each chemical is individually adjustable for coarse variations by changing the stroking rate through a two-step cone pulley and belt arrangement. For fine variations, a stroke length adjustment knob on top of the Chem-O-Feeder instantly varies the amount of solution fed per stroke. Transparent plastic reagent heads bare vital operating parts to visual observation by the operator while the equipment is in operation. Also, each discharge stroke of the feeder is visible in sight feeder domes and any feeding irregularity may be detected. Moving parts inside the rugged unit case operate in an oil bath, resulting in long wearing life.

Conveyor QC 853

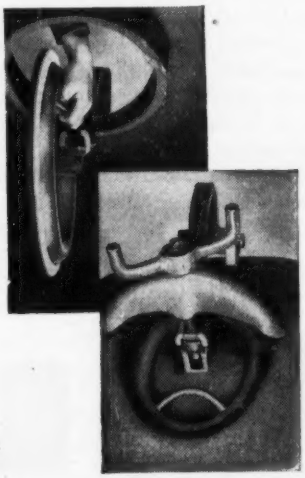
Production of a new rust-proof, dustproof, portable conveyor is announced by the E. W. Buschman Co. The wheel treads and hubs of the wheels used are protected with a heavy zinc plate. The side discs of the wheels are red baked enamel. A special inner seal excludes water, dust, grit or other harmful foreign matter from the full ball bearing, insuring smooth operation and long life.

The conveyor is interchangeable with Buschman standard portable conveyor and accessories. Ten foot and 5-foot lengths are available as well as 90, 60, 45 and 30 degree curves with an inside radius of 2'-6". The curves are reversible and are supplied with guard rails on the outside and adjustable center leg supports. The weight of the conveyor is approximately 7 to 8 pounds per foot.

Standard adjustable tubular stands for supporting the conveyor, package stops and other accessories are available. The stands incorporate Buschman's "Quick-Eez" coupling which permits rigid coupling and removal of any section without distributing adjoining sections.

Supported Manhole Cover QC 854

A new support device, in conjunction with standard, elliptical manway covers



of the Lenape Hydraulic Pressing and Forging Co., permits such covers to be manipulated and withdrawn through the opening, and swing aside on the extension of the vessel, in contrast to ordinary support which swings the cover inward only.

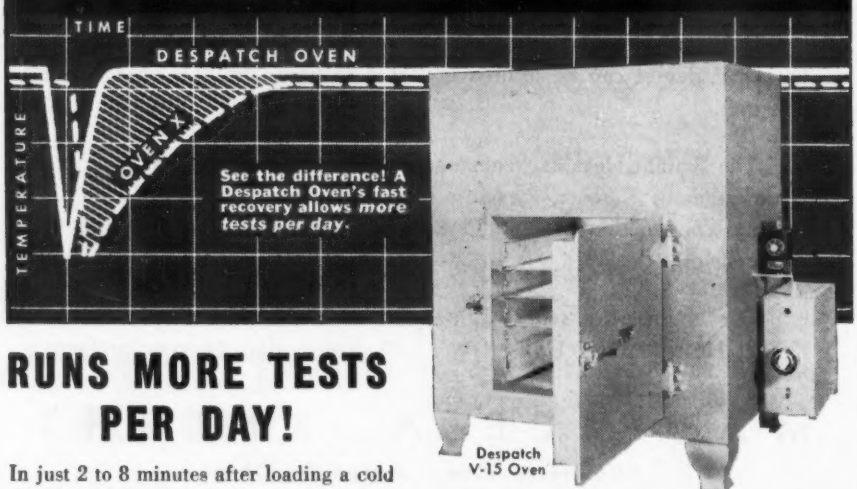
These manway covers are available in standard sizes for 10" x 15" to 18" x 24", and are used wherever manways are required for frequent access. They can be made in carbon and stainless steel.

Enclosed Motor QC 855

A new totally enclosed, fan-cooled motor for use in extremely dusty, dirty, and corrosive atmospheres has been added to the line of General Electric Tri-Clad induction motors. The new motor is available in standard, explosion-proof, and dust-explosion-proof types from 1 to 1,000 HP and can be used in Class I Groups C and D and Class II Groups E, F, and G hazardous locations. Short in length and compact in construction, the motor can be installed in a small space, making it suitable for applications where the motor must be part of the driven machine.

The new Tri-Clad features a double-shell, cast-iron frame, and cast-iron end shields and conduit box for protection from external blows, dripping water, etc. Sealed end shields and inside joints, and a one-piece, double-shell stator protect windings, punchings and rotating parts

A DESPATCH LABORATORY OVEN



RUNS MORE TESTS PER DAY!

In just 2 to 8 minutes after loading a cold charge, a DESPATCH Laboratory Oven recovers heat . . . to let you handle more tests per day! This typical *extra* feature cuts time lost between tests, helps you obtain accurate data faster, eases your laboratory routine.

WRITE FOR BULLETIN 105. Illustrates important new features, applications.

BODY: Extra rugged, compact and with 3" insulation throughout; attractive baked enamel exterior. HEATING SYSTEM: Despatch cross-flow forced draft; electric or gas-fired heater. CONTROLS: Thermostatic, ±1°C. sensitivity; 3-heat switch. HEAT RANGE: 35° to 260°C. MODELS: One or 2-door with removable mesh-screen shelves; sizes (inside) 13" x 13" x 13" to 37" x 25" x 37" Heating elements guaranteed 5 years.

NEW 1946 MODELS NOW AVAILABLE

SEE YOUR LOCAL DEALER OR WRITE DIRECT

DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

Sew without thread the Thermatron *way*

New Thermatronic method of sealing thermoplastics

Raincoats, shower curtains, toaster covers, food protectors, plastic "patent" leather bags, shoes, play balls and hundreds of other fabricated plastic products are no longer being stitched or sewn with resulting perforations and weakening of the material.

Electronic welding, or the generation of heat by radio frequency power produced by the THERMATRON, is replacing it. Seals are made in seconds to produce a seam stronger than the material itself!

DO YOU KNOW? . . . the THERMATRON seals in seconds to produce a seam that is air-tight and water-tight! . . . almost any product fabricated of thermoplastic sheeting which has hitherto been stitched or sealed by resistance heating or adhesives can be THERMATRONICALLY sealed — faster, better, and cheaper!

METHOD: Application of radio frequency power supplied by the THERMATRON to films or sheets, generates sufficient heat within the material to cause them to flow together.

COMPLETE LINE: THERMATRONS are rated in Kilowatt outputs of 1, 2½, 5, 7½, and 15 KW with other models available in 60—100—125 Kilowatt outputs. Standard ovens and presses make these units completely self-contained and ready-to-use, no complicated installation or operation. Units are completely enclosed, no working parts exposed.

APPLICATION ENGINEERING: Prospective purchasers are invited to make use of the facilities of our testing laboratories.

Inquire NOW! Fabricators are rapidly adopting THERMATRON industrial electronic sealers as the answer to high speed production of innumerable new plastic articles.

THERMATRON dielectric heaters, completely self-contained and ready-to-use are also available to molders for pre-heating rubber and plastic preforms, and for laboratory, wood glueing and general purpose use. Write for free copy of the new bulletin "Electronic heating with THERMATRON."

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29th & GRAY'S FERRY ROAD PHILADELPHIA, PA.

FULL MEASURE IN EVERY BAG

With the Sift-Proof Fold

Saranac Model D Bag Sealers, closing packages at one stroke with a tight reverse double fold, make the seal *the strongest part of the bag.* Production — 600 to 800 closures an hour — is fast and economical.

WRITE FOR BULLETIN C1-8

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For Powerful Detergency, Emulsifying, Wetting, Dispersing and Unusual Water Softening properties

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A mild, highly purified, salt-free synthetic in liquid form, water-miscible and oil soluble, efficient and stable in acid and alkali; not precipitated by metal salts; wide range of compatibilities; may be used with soap.

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from moisture or corrosive elements. Long, close-running shaft fits, supplemented by a rotating seal, keep dirt from entering the motor along the shaft. Punchings and windings within the inner shell of the motor are cooled by a non-sparking external fan which is protected by a cast-iron housing with a screened air-intake opening.

The cast-iron bearing housings are cast integral with the end shields as a barrier to the entrance of foreign materials. An inner cast-iron bearing cap makes a complete enclosure for the bearing. As on all ball-bearing Tri-Clad motors, the pressure-relief greasing system is used. Greasing can be accomplished without disassembling or stopping the motor.

Low starting current, with balanced design, makes the new Tri-Clad suitable for full-voltage starting, permitting the use of simple, inexpensive control equipment. The motor has high pull-up torque for snappy acceleration, and high maximum running torque to meet temporary abnormal peaks and low-voltage conditions.

High Frequency Voltmeter QC 856

The Model 29 high frequency probe, recently developed by Alfred W. Barber Laboratories, provides a means of measuring voltages in high frequency circuits.

Designed to meet the need for a radio frequency probe with an extremely low input capacity, the Barber innovation, with an input capacity of ½ to 1 micro-micro-farad, extends the range of measurements from 50 to 500 megacycles.

Carbon Dioxide Fire Extinguisher QC 857

Randolph Laboratories has produced a new trigger-touch 15 lb. CO_2 extinguisher

that is carried and operated with uninterrupted, single-sweep action. By grasping the unit by its arched-steel handle, the employee can remove the extinguisher from its bracket, carry it with only one hand. The other arm is free to remove obstacles and open doors while en route to the scene of action.

On approaching the fire, the operator grasps the nozzle handle with his free arm, aims it at the base of the flames. One touch of the thumb-trigger discharges a penetrating, snowy blanket of carbon dioxide gas . . . smothers an 8 quart gasoline fire in 9 seconds under official Underwriters' Laboratories fire tests. Release of the trigger stops the flow.

Marker for Stamping Round Bars QC 858

A new line of convex marking devices for stamping part numbers, serial numbers, etc., on the periphery of cylindrically shaped parts, has been introduced by New Method Steel Stamps, Inc.

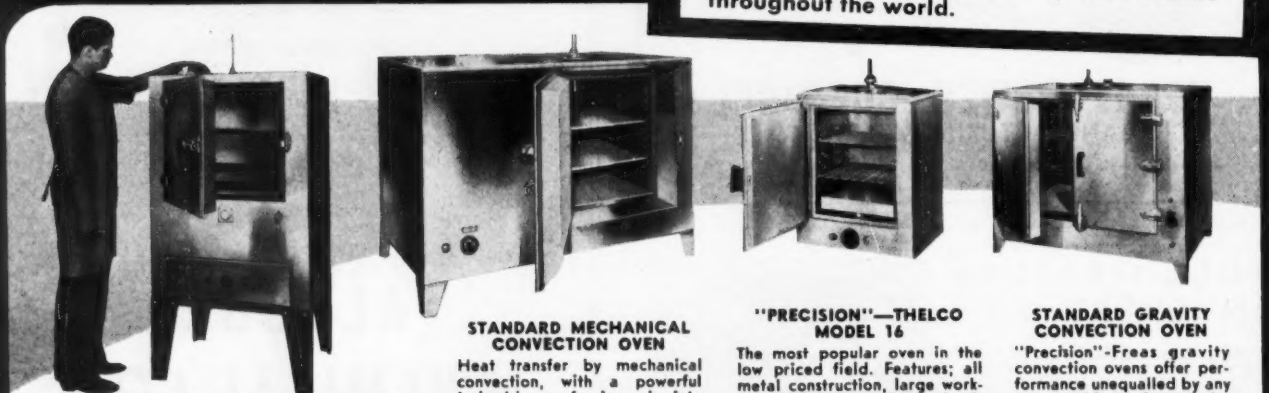
Interchangeable steel type characters are held securely in place by a steel plate attached to the body of the holder with two set screws, assuring quick change and easy set-up of interchangeable type.

Each piece of type fits securely against the hardened steel anvil of the type-holding recess. In this way, impressions of equal depth and clarity for all characters are obtained with one blow of the hammer.

The new convex marker is of "semi-standard" design, since parts to be marked having different radii require different holders and type. Type capacity also can be readily varied to meet individual requirements by using spacers where full type capacity is not required. The handle of the holder is knurled for secure handling and tempered for long service under severe conditions.

PRECISION FREAS
TEMPERATURE CONTROL CABINETS

Developed to an unusual degree of efficiency and covering almost every laboratory process involving controlled temperatures, the "Precision"-Freas line has established an unsurpassed record for performance and dependability which is recognized by laboratories throughout the world.



FLOOR MODEL MECHANICAL CONVECTION OVEN
Saves space. Offers peak oven efficiency for hundreds of laboratory applications. Interiors, 18-8 stainless steel; exteriors, stainless steel or rust-resistant iron. Three standard sizes—two temperature ranges.

STANDARD MECHANICAL CONVECTION OVEN
Heat transfer by mechanical convection, with a powerful turbo-blower forcing air into motion through the working chamber allows heavy loading and fast development of desired temperature. Interiors are 18-8 stainless steel, exteriors are of either stainless steel or rust-resistant iron.

"PRECISION"—THELCO MODEL 16
The most popular oven in the low priced field. Features; all metal construction, large working chamber, two latticed adjustable shelves, thermometer holder, hazard safe door latch, sealed hydraulic thermostat, and many other engineering developments. Makes limited budgets go twice as far.

STANDARD GRAVITY CONVECTION OVEN
"Precision"-Freas gravity convection ovens offer performance unequalled by any comparable equipment. Interior walls, brackets, fastenings 18-8 stainless steel. Exterior stainless steel or rust-resistant iron. Four standard sizes—two temperature ranges.

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Heat Exchangers
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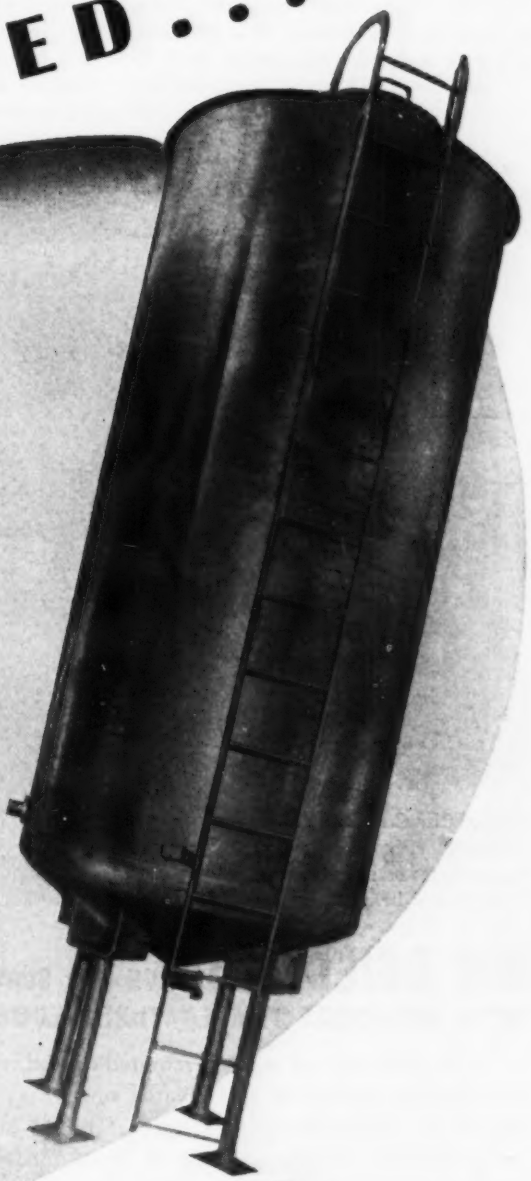
IF IT'S AN *Aluminum* UNIT YOU NEED . . .



We have two qualifications to offer in connection with aluminum equipment in the pressure vessel and heat-transfer group:

1...Years of pre-war as well as war experience with this useful metal.

2...Years of experience in the design as well as construction of many types of process units.

This combination is not too prevalent in the equipment manufacturing field. It is assurance to you that your equipment will be soundly constructed and that it will be properly designed, should you want the help of our engineers.

Considering that we are well-experienced with aluminum and know heat transfer equipment and pressure vessels, why not call on Patterson-Kelley to help in connection with aluminum equipment you require for processing?

THE PATTERSON-KELLEY Company, Inc.

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Cathode Ray Tube QC 859

Greater brilliance and deflection sensitivity characterize the new Du Mont Type 3JP cathode-ray tube just released by Allen B. Du Mont Laboratories, Inc. This type is the logical successor to the wartime Types 3BP and 3FP, combining the best qualities of each.

The 3JP is designed for oscillographic and other applications requiring a small, short tube with very high light output and deflection sensitivity. It is an excellent tube for equipment which must be operated under extremely strong ambient light conditions. The focusing electrode current under operating conditions is negligible, thereby simplifying bleeder design. The 2" neck and diheptal base provide adequate insulation between electrode leads for high-altitude installation.

Spray Dryer QC 860

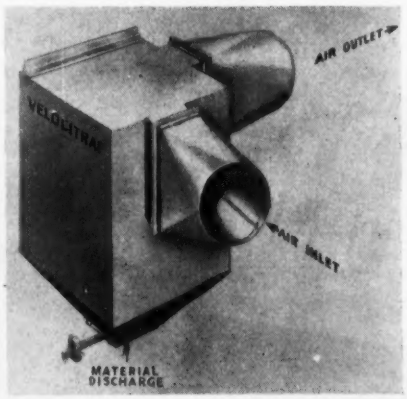
The new model 10-S spray dryer of Research Equipment Engineers is a completely packaged unit capable of drying up to 15 pounds of solids per hour.

The solution or fine slurry to be dried is sprayed into a stream of hot air under carefully controlled conditions in such a manner that the moisture of the atomized particle passes into the warm surrounding air and the particle of solid material is not heated beyond the wet bulb temperature of the incoming air, generally in the range of 120-170° F. Specially countercurrent heat transfer is effected in this machine by making air plus particle stream pass through the outer edges of the heated zone, giving a dryer particle and a better heat efficiency than possible in other designs.

The machine is built entirely of stainless steel and is insulated and covered with enamel steel sheeting.

Dust Trap QC 861

Placed in the intake duct ahead of the collector, the new Velocitrap of Claude B. Schneible separates solids from the air

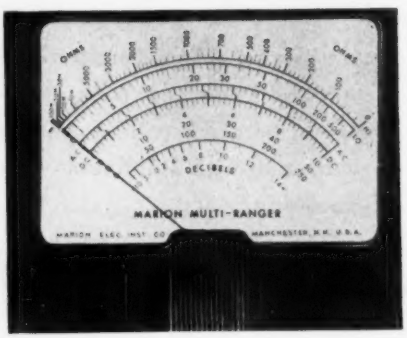


stream by means of a correctly engineered, slot-shaped opening in an elbow of the duct within the unit. Solid particles are expelled by centrifugal force through the slot and deposited in a hopper. Only a minimum of solids reach the dust collector. A smaller shielded slot, placed opposite the intake slot, re-admits the air into the duct and prevents back pressure.

The Velocitrap is made in four types for various operating conditions and in a wide range of sizes with capacities from 2,000 to 20,000 cfm. The unit is adaptable to any wet or dry-method dust collection system.

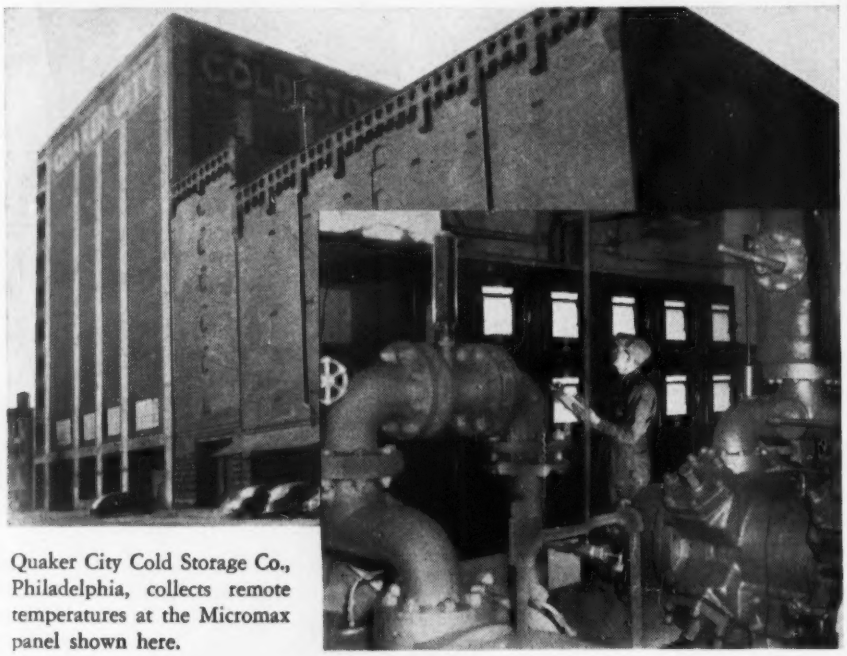
Electric Meter QC 862

A new foundation instrument, the Marion Multi-Ranger, for assembling an instrument for use as a voltmeter, milli-



ammeter, high and low resistance ohmmeter, A. C. voltmeter and decibel meter, has been announced by the Marion Electrical Instrument Co.

The Multi-Rangers are available in 3½, 4½ and 8½-inch sizes and each size is interchangeable electrically. The basic sensitivity of the instrument is 400 microamperes and the internal resistance is 500



Quaker City Cold Storage Co., Philadelphia, collects remote temperatures at the Micromax panel shown here.

BIG BUILDINGS SAVE BIG SUMS WITH MICROMAX TEMPERATURE RECORDERS

The daily miles of walking required to read temperatures in the big Quaker City building shrank to a few yards when Micromax instruments centralized the job of temperature recording. And this is just one reason why Micromax saves time, effort and money for efficiency-minded building managers. Along with the reduction in labor, temperature changes are reported more quickly and therefore corrected more promptly. This gives not only a substantial saving in power, but also a smoother temperature curve for each building area.

If you're interested in the *why* of Micromax instruments' superior performance in centralizing temperature reading, send for Catalog N-33A (Micromax Thermocouple Pyrometers) or Catalog N-33C (Thermohms). Or, for help on a specific problem, request the services of an L&N engineer.

LEEDS & NORTHRUP COMPANY, 4982 STENTON AVE., PHILA., PA.

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MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT TREATING FURNACES

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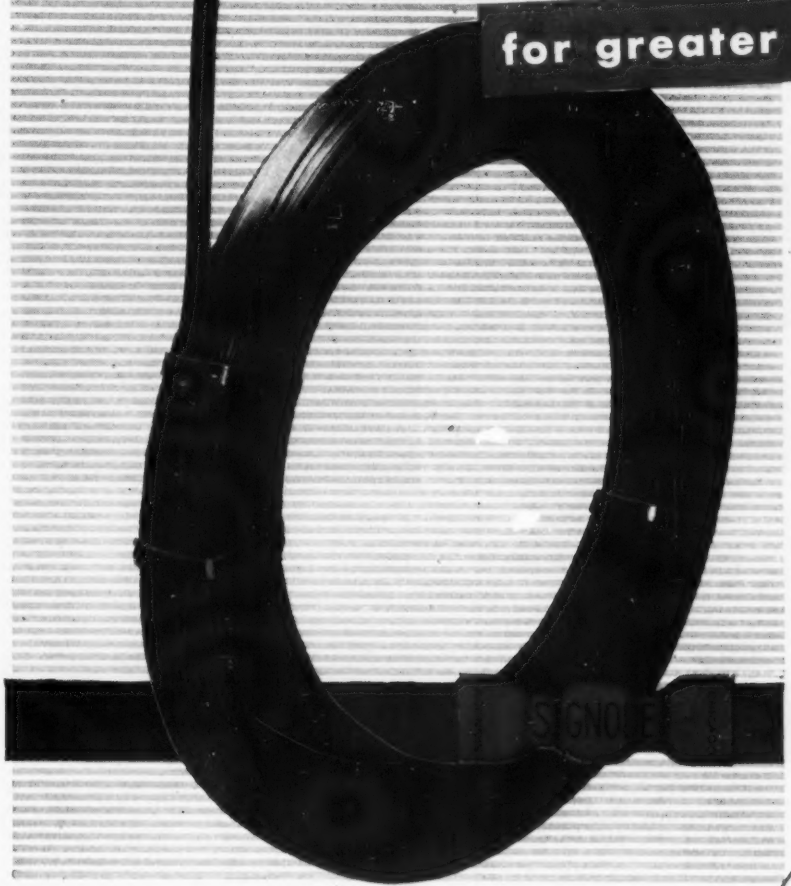
NOTHING PROTECTS LIKE STEEL

for CONTAINER PROTECTION

in packing goods

for greater security in shipping



The Signode System of Steel Strapping Makes the Most of Steel's Protective Qualities

Signode Steel Strapping gives top protection because it does not fray, loosen or break. Of calculated strength, Signode Steel Strapping properly tensioned, absorbs the damaging shocks of handling and transit movements. Whatever your product—there is a Signode application that assures the greatest possible security.

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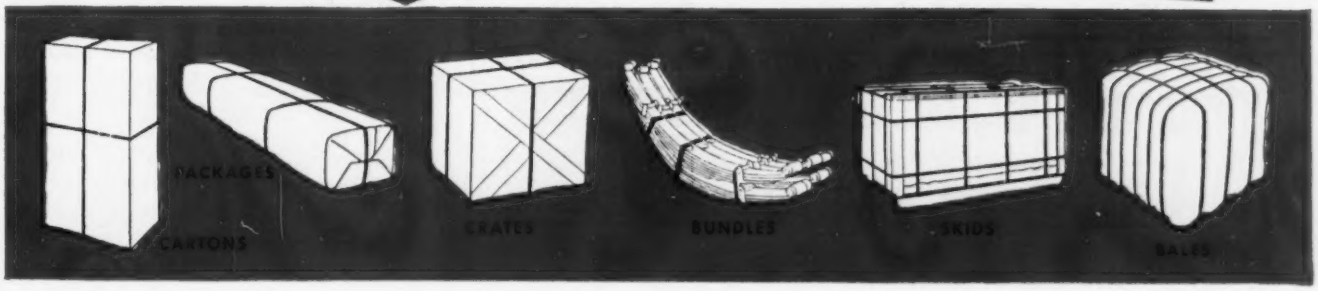
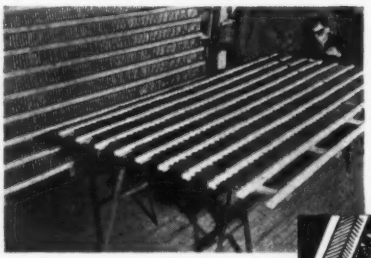


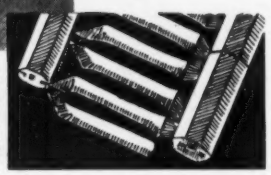
There's Longer Life at Lower Cost ... in All TRENT TRADE MARK

HEATING ELEMENTS



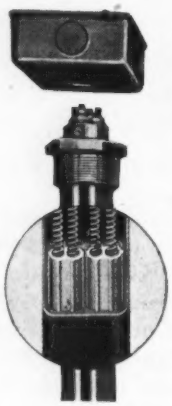
"Folded-and-Formed"

Patented ribbon type heating elements that produce uniform temperatures up to 2000° F. The most durable and economical means of heating electrically. Assure continuous, trouble-free service.



Above: Constructing banks of "Folded-and-Formed" heating elements for large core baking ovens used in manufacture of electric motors. Units can be furnished in any size, for straight or curved installations.

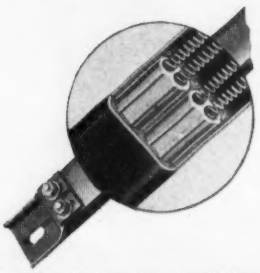
FEATURES: Uniform heat distribution. No localized hot spots. No internal connections. Minimum carbonization. Low surface temperature of elements. Unequalled service life.



IMMERSION HEATERS...

Seamless brass or copper blades — rigid, durable, long-lasting. Nickel-chrome resistance wire in high quality refractory tubes. All free spaces filled with refractory powder, by method that assures maximum heat conduction and absence of dead air. Terminal head welded to blades. Heat can be uniformly maintained for entire length of unit or concentrated at selected portions.

STRIP HEATERS



Seamless steel casing absorbs heat quickly. Nickel-chrome resistance wire in high grade refractory tubes. All "dead" space completely insulated. Sealed-in porcelain terminal block. Thorough pre-formed insulation insures equal distance between wire and casing for entire length of unit.

CARTRIDGE HEATERS

For your molds, platens and dies. Pigtail, spade or right-angle terminals. From ⅜" to 1-5/16" diam., 2½" to 2½ feet long. Efficiently insulated and designed to provide quick, uniform heating.

SPECIAL DESIGNS

If you have an out-of-the-ordinary heating problem, tell us the conditions involved and let our engineering department suggest the correct solution. Your inquiry will receive prompt attention.

Write for Complete Information and Prices.

TRENT *Electrically Heated Industrial Equipment*

HAROLD E. TRENT COMPANY

FURNACES • OVENS • HEATING ELEMENTS
LAB and SPECIAL EQUIPMENT • KETTLES

244 LEVERINGTON AVENUE PHILADELPHIA 27, PA.

ohms, ±1%. Alnico magnets are used. The scales are printed in red, black and green for quick identification.

The instrument is ideally suited for use as a 2500 ohm-per-volt or as a 1000 ohm-per-volt meter, as a milliammeter, low and high range ohmmeter and as a 1000 ohm-per-volt A. C. voltmeter. With proper switching arrangements all these features can be incorporated in one unit.

The scale ranges, as normally supplied, include: 0-10-50-250 D. C. volts, 0-10-50-250 A. C. volts, 0-500 ohms and –10 megohms, –10 to plus 14 db. By use of the proper multiplier the 0-10 voltmeter scale can also be used as 0-100 volts.

Circuits supplied with each instrument provide clear instructions for the construction of single or multi-range equipment; all component values are shown on the circuits.

3-Way Valve QC 863

Employing a flexible molded synthetic rubber tube, encased within a Bakelite body, the new Flex-tube three-way valve

of the Grove Regulator Co. is designed to handle all types of fluids. It is especially suited for hydraulic or pneumatic cylinder operation. Due to its unrestricted straight flow charactéristic, this unit is most satsfactory for controlling viscous or solid-carrying fluids.

Non-metallic construction permits the handling of highly corrosive or erosive liquids or gases. Manual operation, by an over-center cam, opens and closes the ports at each half turn of the handwheel. A special self-locking feature assures positive shut-off over extended periods of time. Available in ⅛" and ¼" I. P. S., these new type valves are furnished for working pressures up to 250 lbs., and maximum temperatures of 150°F.

Electric Furnace QC 864

The Harold E. Trent Co. has announced the introduction of a new Trent DKR electric furnace for use of temperatures up to 2500° F. It consists of heavy sheet metal casing and high-temperature brick insulation both in the furnace body and lever-operated door. It has full automatic control and atmospheric control can be obtained at the purchaser's option. Heat is supplied by Globar elements and the size is 8" x 5" x 15".

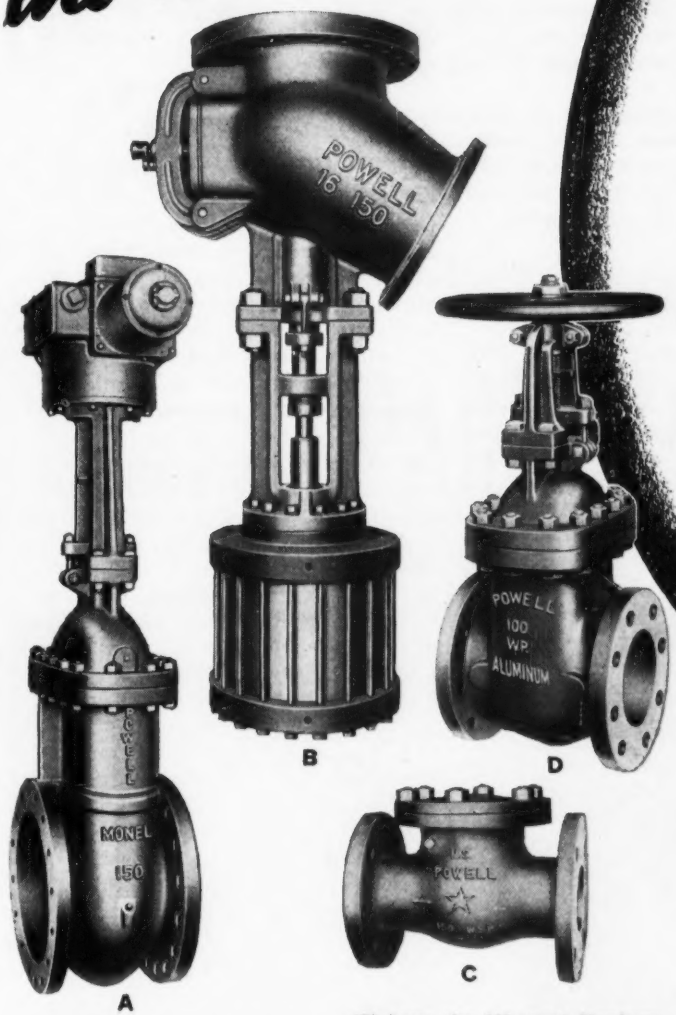
For assured performance, the valve must suit the service!

Years ago Powell pioneered in making Cast Steel Valves to handle flow control requirements for which bronze and iron valves were not fully suited.

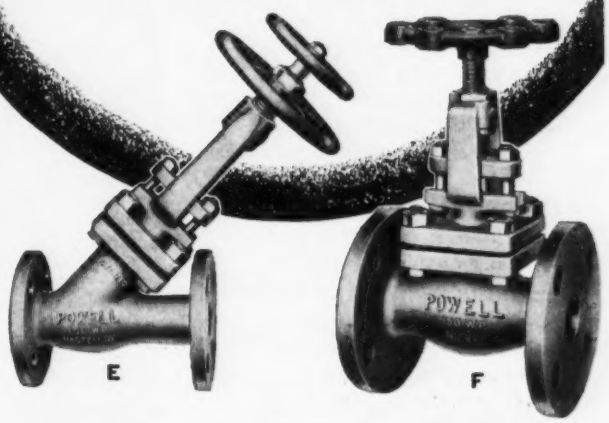
Later, the development of the chemical and process industries imposed new demands; namely, for valves to handle corrosive media. Again Powell blazed the trail and today, in addition to Bronze, Iron and Steel Valves of every required type, size and pressure, Powell offers not only the Cast Steel but also many special designs in the widest range of pure metals and special alloys* ever used in making valves.

In short, Powell is prepared to supply the *right* valve for every service in the Chemical and Process Industries. In writing for catalogs, specify whether you are interested in Bronze and Iron; Cast Steel; or Corrosion Resistant Valves. If you have any flow control problems, consult Powell Engineering.

The Wm. Powell Co., Cincinnati 22, Ohio



A B C D



E F

(A) Large size 150-pound Monel Metal Gate Valve with flanged ends and bolted flanged bonnet. Top-mounted electric motor operator provides quick, positive opening and closing by remote control.

(B) Large size 150-pound Special Alloy Flush Bottom Tank Valve for attaching to metal tanks or autoclaves. Air Cylinder operated. Has special quick opening cleanout pocket, through which disc washer may be easily replaced as well as all sediment removed from the valve.

(C) 150-pound Ampco Metal Swing Check Valve. Flanged ends and bolted flanged cap. Sizes 2" to 12", incl.

(D) Large size 100-pound Aluminum Gate Valve with flanged ends, bolted flanged bonnet, outside screw rising stem and taper wedge double disc Can be supplied with 18-8 disc and stem.

(E) 150-pound Hastelloy Alloy "Y" Valve with flanged ends, bolted flanged bonnet, and outside screw rising stem. Equipped with Powell Patented Seat Wiper, which clears the faces of any corrosion products or adhering materials, insuring a tight metal to metal contact between seat and disc. Sizes ¼" to 2", inclusive.

(F) 150-pound Nickel Globe Valve with flanged ends, bolted flanged bonnet and outside screw rising stem. Sizes ¼" to 3", inclusive.

***Send for booklet "Powell Valves for Corrosion Resistance", available in the following Pure Metals and Special Alloys.**

Acid Bronzes	Hastelloy Alloys "A", "B", "C" and "D"	Silver (Pure)
All Iron	Herculoy	4-6% Ch. .5 Mo. Steel
Aluminum	Inconel*	18-8S
Aluminum Bronze	Illium	18-8S Mo.
Ampco Metal	Misco "C"	11.5-13.5% Ch. Iron
Carbon Steel	Monel Metal*	18% Ch. Iron
Durimet "T", "20"	Nickel (Pure)	28% Ch. Iron
D-10	Nickel Iron	25% Ch. 12% Ni. Alloy Steel
Everdur	Ni-resist*	
Hard Lead		

*Registered trade-names of the International Nickel Co., Inc.

POWELL VALVES

PACKAGING & SHIPPING

by T. PAT CALLAHAN

I. C. C. Amendments

Effective April 19, 1946, certain amendments and additions to the I. C. C. regulations were made as follows:

Ethyl chloroformate has been cancelled as a Poison Class C and reclassified as a corrosive liquid. Methyl chloroformate has also been classified as a corrosive liquid. In each case 5 pints in any outside container is the maximum which may be shipped by express.

T. Pat Callahan

The amount of mixed (nitrating) acid which may be shipped in any one outside container has been reduced from 5 pints to 2½ pints if the shipment is made by express.

Hexafluorophosphoric acid has been added to the regulations. This material is classified as a corrosive liquid.

Hydrocyanic acid, liquefied, has been added to the regulations. This material is classified as a Poison Class A.

Thorium metal powder has been added and classified as an inflammable solid. (See Section 211B for packing.)

Zinc peroxide has been added and classified as an oxidizing material.

Section 110(a) 10 has been amended in providing for the shipment of any inflammable liquid with flash point 20° F. or below. In addition to 21A fibre drums with specified inside packing, plywood drums Specification 22A and 22B are added.

Section 211B is added as follows:

"Thorium metal, powdered, must be packed in specification containers as follows: (b) Spec. 15A or 15B. Wooden boxes with inside metal containers, tightly and securely closed by push-in covers held in place by soldering at least at four points, or in screw-cap type metal cans. Inside containers must not exceed 10 pounds net each. Gross weight of outside package must not exceed 75 pounds."

A note to Section 247E has been cancelled. Previously this note permitted the shipment of sulfur chloride under certain conditions in ICC 5 Drums. The cancellation of the note to Section 247E eliminates the use of these drums for sulfur chloride.

Section 260A adds the packing provisions for ethyl chloroformate and methyl chloroformate. These are as follows:

"Spec. 15A-15B or 15C. Wooden boxes with glass inside containers not over 1 pint each, cushioned with incombustible mineral material.

"Specification 1A—Boxed Carboys."

Section 275 (a), (b), (c), (d), (e), have been amended. This amendment refers to shipments of difluorophosphoric acid, anhydrous, monofluorophosphoric acid, anhydrous, and hexafluorophosphoric acid.

Any company shipping any of these materials should consult the ICC regulations concerning requirements for packaging. Section 332 (a) (1) is amended by adding hydrocyanic acid, liquefied.

Rubber Bleach Barrels Again Available

The Goodall Rubber Co., 5 S. 36th St., Philadelphia 4, Pa., has announced that rubber bleach barrels are again available to users of sodium hypochlorite and similar chemicals.

A feature of these barrels is the interchangeable rubber liners which fit snugly into the steel drum. They are easily removable for repair, if necessary, and their use permits more efficient utilization of the steel drums.

Continued Burlap Shortage Foreseen

Indian political unrest, labor difficulties, a food shortage and a thriving black market all will hinder burlap supplies in 1946, according to Ferdinand H. Rhoden, head of burlap purchases for Chase Bag Company. Mr. Rhoden recently returned from Calcutta, where he spent 60 days in the interest of Chase's buying operations.

Mr. Rhoden reports that it is doubtful if burlap importations can be expected to eliminate the current textile bag shortage in this country. The acreage to be licensed by the Indian Government has been reduced by 25 per cent compared to last year in favor of rice and other food grains which are critically needed. Nevertheless, the prospects for the jute crop are fair, and given good weather it is hoped that the out-turn will not be much less than the current crop. The likelihood of a short crop, together with labor and political disturbances, means that increased production of the mills is out of the question. Maintenance of present schedules will be about the best that can be expected.

Fibre Drum Industry Forms Trade Association

The fibre drum industry now has a permanent organization. Following preliminary meetings in New York and Chicago during February and March, the organization was formally completed at an industry meeting at the Hotel Statler, Cleveland, Ohio, April 23, 1946.

Mr. H. L. Carpenter, President, Carpenter Container Corp., Brooklyn, New York, was elected President; Mr. W. J. Mahoney, Pres., Master Package Corp., Owen, Wisc., is Vice President; Glenn Mather, The Container Company Div. of Continental Can Co., Inc., Van Wert, Ohio, is Secretary; Mr. R. C. Carlson, President, Emery-Carpenter Container Co. of Cincinnati, Ohio and Chicago, Ill., is Treasurer.

Five directors were elected at the Cleveland meeting: Mr. H. L. Carpenter, Mr. W. J. Mahoney, Mr. R, C. Carlson, Mr. C. E. Eggerss, Vice President, Container Company Div. of Continental Can Co., Van Wert, Ohio; and Mr. R. F. Gumbert, Gen. Mgr., Plyfiber Corporation, Garwood, New Jercey. A committee on transportation was created consisting of Mr. C. E. Eggerss, Chairman, Mr. Henry Craemer, Carpenter Container Corp., Brooklyn, N. Y., and Mr. A. J. Godschalk, Pioneer Cooperage Co., Chicago, Ill.

A Committee of ten was created to handle Industry Relations and Federal Agency Contacts: Mr. W. J. Mahoney, Chairman; Mr. R. F. Gumbert, Vice Chairman; Mr. R. C. Carlson; Mr. George T. Dyer Jr., Pioneer Cooperage Company, Chicago, Ill; Mr. John Gotwals, Philadelphia Carpenter Container Corp., Philadelphia; Mr. Hugo Kirschner, Buffalo Carpenter Container Co., Buffalo, N. Y.; Mr. Albert Knabb, Steelfiber Drum Mfg. Co., Chester, Pa.; Mr. D. F. Manion, Manion Steel Barrel Co,. Rouseville, Pa.; Mr. Paul Strange Jr., John Strange Pail Co,. Menasha, Wisc.; Mr. Harold M. Walter, The Container Company, Div. of Continental Can Co., Inc., Van Wert, Ohio.

Price control subjects will be handled as before by the Industry Advisory Committee appointed by the government in 1943, of which Mr. H. L. Carpenter is

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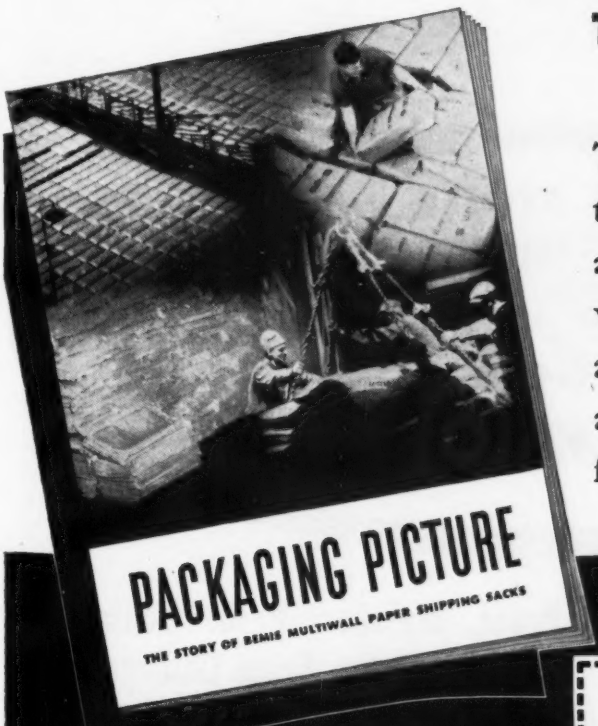

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Wichita

chairman and Mr. Glenn Mather is Secretary.

The by-laws state that the objects of the Association "shall be to promote the best interests of the fibre drum industry in the United States and foreign countries . . . to foster equitable business practices . . . to promote activities calculated to enable the industry to conduct itself with the greatest economy and efficiency and with maximum service to the public . . . to promote friendly relationships among members . . ."

Bureau of Explosives Submits 1945 Report

The Chief Inspector of the Bureau of Explosives has recently submitted his annual report for 1945. This report starts off with a summary of the activities of the Bureau.

This report covers, in a very comprehensive manner, the fine work being performed by the Bureau, which definitely affects the shippers of chemicals.

By a series of tables the report shows very interesting statistics and we feel all shippers of hazardous chemicals will be very much interested in the information published in this manner.

Table No. 2 is the record of shipments of explosives and other dangerous articles in rail freight and rail express transportation which were involved in accidents and resulted in fires, explosions, fatalities, or injuries to persons. The table also shows the causes of the accidents.

Table No. 3 is the record of shipments of dangerous articles, other than explosives, in rail express transportation which resulted in fires, explosions, fatalities, injuries to persons, or property loss.

Table No. 4 distributes the property loss according to the principal causes of the accidents for each class of dangerous articles and explosives. It will be seen that the combined loss chargeable to derailments and collisions in which explosives were involved is $12,696. This loss is equal to 50½ per cent of the total loss in the handling of all classes of explosives.

Table No. 5 is the record of all of the accidents that occurred during the year in each class of hazardous articles and the record of the fires, explosions, fatalities, persons injured, and property loss chargeable to each class, with a summary of the total losses of all classes for each year from 1935 to 1945, inclusive.

Tables will appear next month.—EDITOR.

SUMMARY OF ACTIVITIES

	1945	1944
Members, Bureau of Explosives—A.A.R.	308	312
Railroads, Affiliated members of Bureau	6	6
Steamship lines, members of Bureau	1	1
Express companies, members of Bureau	3	3
Affiliate members of Bureau	99	98
Bureau Inspectors in field work	35*	33**
Total number of routine inspections:	25,675	23,907
Railroad freight stations	4,517	4,566
Railroad yards	1,413	1,315
Explosive factories, refineries, acid, compressed gas plants, etc.	1,050	875
Express offices and depots	2,205	1,578
Steamship piers	9	9
Storage magazines for explosives	575	450
Tank car loading or unloading locations	667	613
Cars containing explosives	1,988	2,280
Cars containing dangerous articles other than explosives	11,968	10,503
Other inspections	1,283	1,718
Cars containing explosives showing serious violations of the regulations	153	311
Boxes of high explosives condemned as unsafe for transportation	125	436
Kegs of black powder condemned as unsafe for transportation	1	1
Conference with railroad officials	7,658	7,289
Conferences with express officials	912	1,374
Conferences with shippers, container manufacturers, etc.	12,414	8,884
Lectures and meetings addressed on the subject of safe transportation of explosives and other dangerous articles	82	116
Attendance at the lectures and meetings	2,818	3,694

* 4 Inspectors with 6 months' service or less.
** 3 Inspectors with 6 months' service or less.

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PLANT OPERATIONS NOTEBOOK

Automatic Control Terminology II

Publication of automatic control terms, as set forth by the American Society of Mechanical Engineers, began in the last issue and will be continued in this and ensuing issues. This list has been compiled by Donald P. Eckman of the Brown Instrument Company division of Minneapolis-Honeywell Regulator Co. and a member of the A. S. M. E. Terminology Committee of the Industrial Instruments and Regulators Division.—Editor.

200. Basic Characteristics

Delaying or retarding effects associated with industrial process control are caused by capacitance, resistance, and dead time (either separately or in combination) and have often been designated as various forms of "lag." These three terms cover the basic concepts involved and, in the interest of clarity, should be used in place of the less exact term "lag."

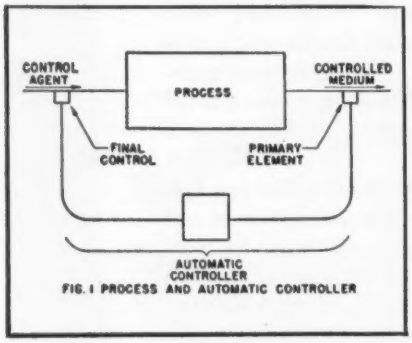


FIG. 1 PROCESS AND AUTOMATIC CONTROLLER

201. *Capacity* is the measure of the maximum quantity of energy or material which can be stored. It is measured in units of quantity. The volume capacity of an open tank, for example, is the maximum volume of liquid it will hold without overflowing. The weight capacity of a compressed air tank is the maximum weight of air which it will hold without exceeding safe pressure.

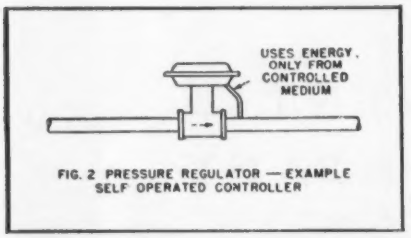


FIG. 2 PRESSURE REGULATOR — EXAMPLE SELF OPERATED CONTROLLER

202. *Capacitance* is the change in quantity contained per unit of change in some reference variable. It is measured in units of quantity divided by the reference variable. The energy or the material being contained and the reference variable determine the type of capacitance. Process capacitance may involve different quantities and reference variables and several types may exist together in one process. The volume capacitance of an open tank with respect to head is the change of volume of stored liquid per unit change of head, which is equivalent in value to the area of the liquid surface. It should be noted that if the shape of the tank causes the liquid surface area to vary with change of head, the capacitance will likewise vary with the head.

The weight capacitance of a gas-filled tank with respect to pressure is the change of weight of stored gas per unit change of pressure. (See Fig. 6.)

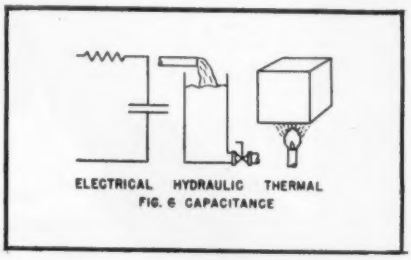


FIG. 6 CAPACITANCE

203. *Resistance* is opposition to flow. It is measured in units of potential change required to produce unit change in flow. (See Fig. 7.)

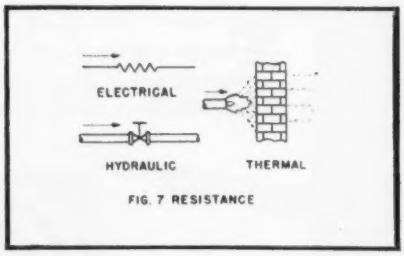


FIG. 7 RESISTANCE

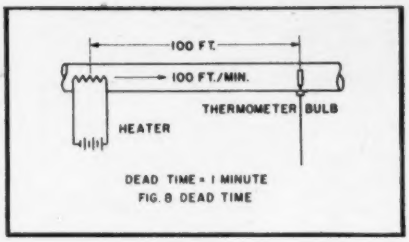
204. *Dead Time* is any definite delay period between two related actions. It is measured in units of time. (See Fig. 8.)

300. Processes, Their Elements and Characteristics

301. A *Process* comprises the collective functions performed in and by the equipment in which a variable is to be controlled.

"Equipment," as embodied in this definition, should be understood not to include any automatic control equipment. (See Fig. 1.)

302. *Self-Regulation* is a sustained reaction inherent in the process which assists or opposes the establishment of equilibrium. (See Fig. 9.)



DEAD TIME = 1 MINUTE
FIG. 8 DEAD TIME

303. The *Controlled Variable* is that quantity or condition which is measured and controlled.

The controlled variable is a condition or characteristic of the controlled medium. For example, where temperature of water in a tank is automatically controlled, the controlled variable is temperature and the controlled medium is water. (See Fig. 10.)

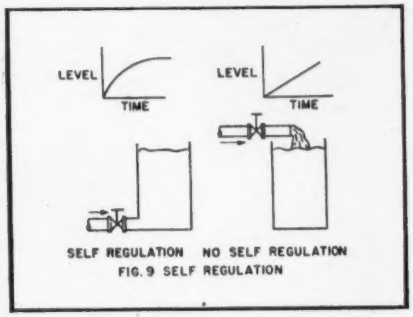


FIG. 9 SELF REGULATION

304. The *Controlled Medium* is that process energy or material in which a variable is controlled.

See 303. (See Figs. 1 and 10.)

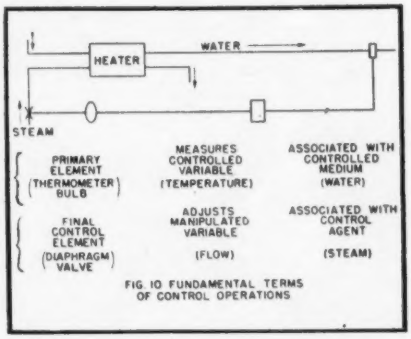


FIG. 10 FUNDAMENTAL TERMS OF CONTROL OPERATIONS

305. The *Manipulated Variable* is that quantity or condition which is varied by the automatic controller so as to affect the value of the controlled variable.

The manipulated variable is a condition or characteristic of the control agent. For example, where a final control element changes the rate of fuel gas flow to a burner, the manipulated variable is rate of flow and the control agent is fuel gas. (See Fig. 10.)

306. The *Control Agent* is that process energy or material of which the manipulated variable is a condition or characteristic. See 305. (See Figs. 2 and 10.)

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U.S.I. CHEMICAL NEWS

JUNE ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1946

Two Phenolic Resins Now Are Available for Immediate Shipment

100% Rosin-Free, They Provide Durability, Chemical Resistance

Arofene 700 and Arofene 775, two well-known U.S.I. pure phenolic resins, are now available for immediate shipment. Both resins are entirely free from rosin and rosin derivatives. Used principally in spar varnishes, chemical-resistant finishes, ethyl cellulose finishes, and in varnishes for fortifying alkyds, they impart excellent durability and remarkable resistance to salt water, acids, strong alkali, and other corrosive substances. Products made with these resins exhibit good color and drying properties.

Arofene 700

Arofene 700 is a heat-hardening, heat-reactive 100% phenolic resin which, in combination with drying oils, gives hard durable finishes. It provides outstanding resistance to chemical reagents in a wide variety of formulations, and produces varnishes of maximum durability. Varnishes made with this resin are unusually pale and exhibit far less after-yellowing than is normally expected from a pure phenolic. They possess good gloss, and with tung or oiticica oils, the inclusion of small amounts of linseed oil produces highest gloss.

To obtain the best results, Arofene 700 should be processed with a preponderance of "hard oils," such as tung or oiticica. Varnishes with oil contents composed largely of "soft oils," such as linseed or dehydrated castor, are practical, but are much slower drying.

The addition of Arofene 700 to other resins in varnish formulations, reduces the cooking cycle of the varnish, or enables the manufacturer to acquire high varnish viscosities which otherwise would be impossible. Its incorporation in this manner, also adds to the durability and resistance of the varnish.

Manufacturers have found Arofene 700 ideal for super spar varnishes, alkali-resistant

(*Continued on next page*)

Improved Thyroid Product Prepared by New Process

To minimize many of the objectionable physiological effects of thyroid preparations used to combat excess weight, a new brominated thyroid compound has recently been invented. This compound is reported to lessen the increased pulse rate, palpitations, emotional upsets, and muscle tremors which sometimes follow thyroid injections.

According to the patent, the brominated product is prepared by treating a commercial powdered thyroid with ethyl alcohol and bromine at room temperatures. After standing over night, the mixture is filtered, and the solid material is allowed to dry at room temperature. The final product is stated to be no different from the original desiccated glandular material, except that it contains 0.2% to 1.5% added bromine.

U.S.I. Opens New Laboratory To Evaluate Wide Range of Products

Installs Complete Facilities For Evaluation Of Chemicals and Insecticides at Baltimore, Maryland

As one of the first steps in its broad program of expansion, U.S.I. has organized an unusually complete laboratory for the evaluation of a wide range of products. The new laboratory, located at Baltimore, Maryland, occupies more than 9000 square feet of floor space and is equipped with the last word in chemical, physical, and entomological testing facilities.

Four major fields of activity are now being investigated in the laboratory: the study of solvents and plasticizers; the testing of anti-freeze compounds and other automotive products; technical service for customers; and evaluation, compounding, and development work on insecticides and insectifuges.

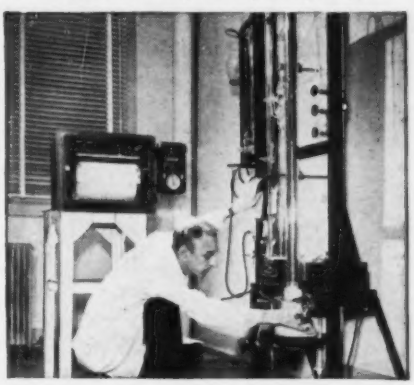
Proceeding on the belief that the success of any new-product program depends in large measure on the accurate evaluation of the commercial performance of new products, U.S.I. has assembled an exceptionally fine staff of chemists, biologists, and entomologists to carry on this work. Activities of the new Technical Development Laboratory will be closely integrated with those of the company's research groups at Stamford, Conn., Baltimore, Md., Newark, N. J., and with the Dodge and Olcott laboratory at Bayonne, N. J.

THE MONTH IN INSECTICIDES

Coats for seeds, containing built-in insecticides, fungicides, fertilizers, and hormones may have far-reaching effects . . . Benzene hexachloride is reported to be seven times more effective against flies than DDT . . . The effectiveness of rotenone oil sprays for combating California red scale is said to be increased by the addition of butyl phthalate . . . Methyl bromide is used to control the pineapple mealybug . . . The Army's smoke apparatus is now being used to deliver superheated oil vapors for treating vegetation . . . A rapid field method for assessing the spreading power of antimalarial oils is developed . . . Cyclopentenylamines are identified as a new group of insecticides . . . Another effective insecticide for house flies is made from Sabidilla seeds . . . A series of new insecticides are used for chicken louse control.

Rats' Cancer Killed By Alcohol Extract

An alcoholic extract which destroys tumors and cancers and sets up immunity against their growth in inbred albino rats has been announced in a technical paper published recently. The extract has been tested successfully on rats, but is not ready for use on humans, the authors said. They stated further that theirs were the first successful experiments of this type.



This ingenious distillation set-up provides accurate analyses of organic solvents quickly.

The Administrative Group of U.S.I.'s Technical Development Laboratory maps out the tests which will determine the performance-value of a new product. Left to right: N. C. Schultze, Assistant Director of the Laboratory, W. E. Dove, Director of the Entomological Division, D. G. Zink, Director of the Technical Development Department, N. C. McAlister, Jr., Assistant to Dr. Dove, and W. L. Johnston, Director of the Laboratory. *(Continued on next page)*

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JUNE ★ **U.S.I. CHEMICAL NEWS** ★ 1946

Makes Alcohol Solutions Of Hydrogen Peroxide

A recently-issued patent describes a method by which strong alcohol solutions of hydrogen peroxide can be prepared. These solutions are reported to be useful in many industrial organic processes in which the aqueous hydrogen peroxide of commerce has been found unsuitable. Hydrogen peroxide is of particular value as a catalytic reagent in many polymerization reactions, and as an oxidizing agent for use in oxidizing and decolorizing certain types of compounds.

The process of preparing the solution consists, basically, of treating the boron ester of an alcohol with commercial aqueous hydrogen peroxide. Boron hydroxide precipitates, leaving a nonaqueous solution of the peroxide. Ethyl, butyl, and amyl alcohol are stated to produce satisfactory solutions.

Phenolic Resins

(Continued from preceding page)

varnishes, and ethyl cellulose finishes. It has also been used widely as a fortifying resin to increase the alkali and moisture resistance of alkyds and other resins.

Arofene 775

Manufactured to meet U. S. Navy Specification 52R11, Arofene 775 is an oil-soluble, 100% phenolic resin of the type which is non-reactive with oils. As the sole resin component in the manufacture of varnishes, it insures excellent chemical resistance and durability, as well as good color and drying properties. As a fortifier in modified resin varnishes, it improves the durability and resistance of the original product.

Arofene 775 can be used with all the usual varnish oils, although it should not be used with straight tung oil. All tung oil varnishes should contain 20% or more of an oil such as linseed. Since this resin is readily soluble and "non-reactive" with oils, relatively simple cooking procedures can be employed with excellent results.

Outstanding spar varnishes and marine paint vehicles are produced using Arofene 775. This phenolic has also been employed widely in the manufacture of finishes resistant to boiling water, salt-spray, alkali, organic solvents, and acids. In addition Arofene 775 has been used advantageously in fortifying a wide variety of varnish formulations.

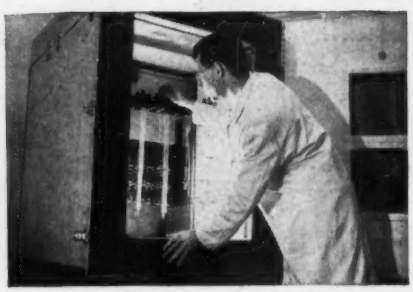
Specifications and samples of both resins are available on request.

New Laboratory

(Continued from preceding page)

Two of the many tests which are necessary for the proper evaluation of an anti-freeze are being conducted here. On the left, the laboratory worker is determining the effectiveness of anti-freeze corrosion inhibitors. The technician on the right is measuring the foaming tendency of an experimental anti-freeze by means of a set-up that simulates the worst possible foaming conditions encountered in an automobile.

All known insecticides and insectifuges and many experimental products run the gamut of tests in the Entomological Laboratory. The jars shown here contain all stages of the common species of cockroaches. Results of tests performed on these insects help guide researchers in thedevelopment of tomorrow's insecticides.



One section of U.S.I.'s Baltimore Laboratory is devoted to the product-evaluation of all types of plasticizers. The technician shown here is testing a plasticizer in the "creep box."

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

To cure troublesome foaming, a new compound is marketed which is said to be effective in concentrations as low as 1 part per million. It is described as a viscous, tasteless, colorless, chemically inert, and non-volatile organic material. **(No. 073)**

USI

To impart crispness to fabrics, a new textile-treating resin is offered which is claimed to eliminate the necessity of starch. It is said to perform satisfactorily on such cotton garments as shirts, children's playclothes and women's house dresses, and to be permanent. **(No. 074)**

USI

A new multi-purpose plasticizer, which the manufacturer claims can be used as a softener, and as an impregnant for waterproof and greaseproof paper coating as well, is described as a viscous, clear-amber, resinous oil. **(No. 075)**

USI

To remove paint and enamels is the purpose of a new compound which is stated to be non-inflammable. It is claimed that this compound can penetrate, loosen, and remove 8 coats of paint in approximately 30 minutes. **(No. 076)**

USI

A new wool dye is said to be equally fast to washing, sea water, and sea water spotting. It is described as a metallized dye, recommended for men's and women's wear, tropical suitings, bathing and sweating yarns, and upholstery fabrics. **(No. 077)**

USI

A self-curing neoprene putty for patching parts of goods molded from Neoprene, Buna S, Hycar, and rubber, and for use as a caulking and gasket cement, is now available. It is stated to have good water, oil, acid, alkali, and flame resistance. **(No. 078)**

USI

A weatherproof and waterproof glue, claimed to be inexpensive and to have superior binding strength, is claimed to last longer than the pieces of plywood which it bonds. It is stated to have passed the 3-hour boiling test with surplus strength. **(No. 079)**

USI

A resilient floor covering is claimed to have the cushioning feel of an expensive deep-pile rug, and yet be washable and tough enough to withstand the heavy traffic of offices and lobbies. It is described as being composed of a durable plastic surface on an 8-inch layer of sponge. **(No. 080)**

USI

A new textile preservative, claimed to be the most versatile, efficient, and long-lasting textile preservative thus far known, is said to afford durable protection against fungi, soil-inhabiting organisms, and jungle rot. It is described as being unaffected by water sprays, weather exposure, sunlight, and laundering, and to be compatible with water-repellent and fire-retardant finishes. **(No. 081)**

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Butyl Acetate
Ethyl Acetate

OXALIC ESTERS
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Diethyl Oxalate

PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS
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Diethyl Carbonate
Ethyl Chloroformate
Ethyl Formate

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Acetoacet-ortho-anisidide
Acetoacet-ortho-chloranilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloranilide
Alpha-acetylbutyrolactone
5-Chloro-2-pentanone
5-Diethylamino-2-pentanone
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Alpha-Oxalpropionate
Ethyl Sodium Oxalacetate
Methyl Cyclopropyl Ketone

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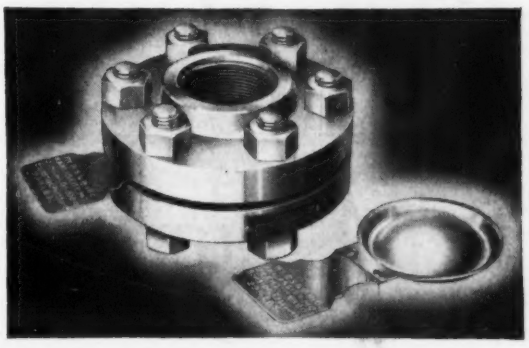

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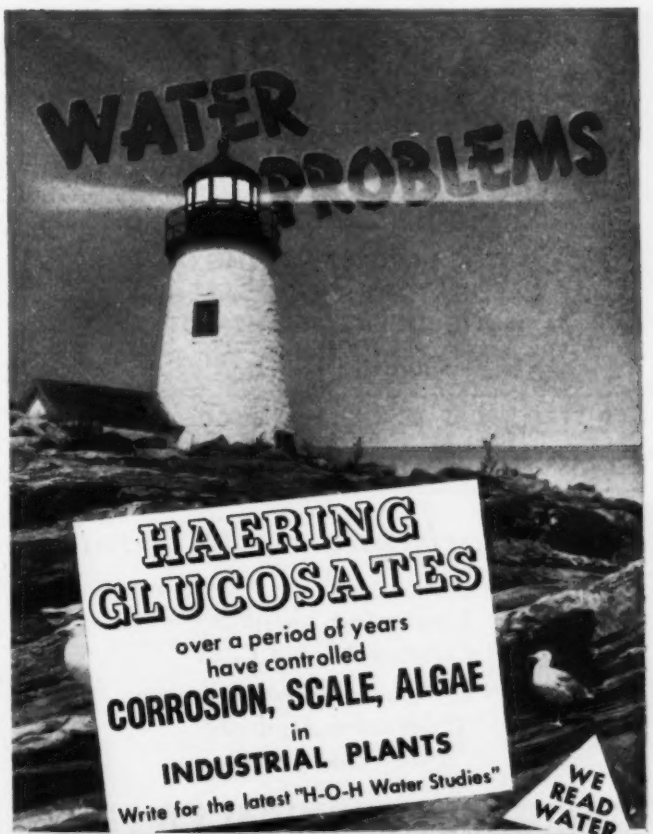

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Electric Furnaces

INDUSTRIAL ELECTRIC FURNACES, VOL. I, *By V. Paschkiss.* Interscience Publishers, Inc., N. Y., 1945. 232 pp. $4.90. Reviewed by R. C. Stewart, metallurgical consultant.

IT IS THE purpose of the author to inspire the designer and user of industrial heating equipment to think in terms of uniform heat transfer to and from the product to be heated, not merely in terms of electricity or fuel. He must think of and express the economic value of a heating operation in terms of quality and overall cost of ultimate product. Special emphasis is placed upon the thermal aspects of furnace design and operation, stress being placed on the frequently unrecognized interrelations of thermal and electrical factors associated with such equipment. Principles of design are discussed in detail, and many types of furnaces illustrated. Many useful design formulas are also included.

Volume I, here reviewed, covers in addition special chapters on arc furnaces with emphasis on steel-making furnaces. A final section covers the design and operation of ferro-alloy furnaces. Volume II will include inductive-capacitive- and resistance heating equipment. In its short span of years electric furnace heating has experienced some remarkable fluctuations, and it is at present enjoying a marked upward trend. This condition, together with recent basic changes in industrial heating practices, makes this volume a very desirable addition to the bookshelf of any industrial heating engineer.

Introductory Text

INTRODUCTORY COLLEGE CHEMISTRY, *by Harry N. Holmes.* Fourth edition. The Macmillan Co., N. Y., 1946. viii + 590 pp. $3.75. Reviewed by William B. Meldrum, Haverford College.

THE APPEARANCE of a new edition of this text, first published over twenty years ago, attests its continued popularity among teachers of elementary college chemistry. The book is written in the author's usual breezy style and furnishes an interesting and easily readable introduction to the science, "adapted to the needs of students who have had no previous training in chemistry."

Of the fifty-four chapters, eighteen, interspersed through the first half of the book, deal with the language and general principles of chemistry, sixteen with the nonmetallic elements and their compounds, thirteen with the metallic elements and their compounds, and the last seven with organic chemistry, with emphasis on commercial products.

"Chapters on the metals have been completely rearranged so that group methods of preparation and group properties are stressed." Specifically: Eight chapters are devoted to the chemistry of compounds of the metals, two to their occurrence and extraction, and three to their properties and uses and to some of their alloys, including steels. So far as the reviewer is aware this is a completely novel arrangement and is to be commended as an excellent method of presentation of subject matter in which the beginning student is not usually too greatly interested.

The book has one serious fault, one that is quite common in the case of general chemistry textbooks: So many topics are included that the treatment of some of them is too brief to be clearly understandable. Authors face a difficult task in selecting from the vast quantity of available material that which will be satisfying to the general student as part of a liberal education and at the same time is essential as a foundation for future courses in chemistry. Nowadays, such a selection must be made. Just where the deletion should have been made in this case would best be ascertained by a roll-call of potential users of the book. The reviewer would choose to omit much of the organic chemistry, which now totals fifty pages. The chapter on *colloids*, pages 334-349, could be abbreviated by judicious pruning. Such topics as *normal solutions*, (page 134), *titration with standard solutions* (pages 196-198), *solubility product* (pages 208-210), *ionization constant* (pages 207-208), and *electromotive force* (pages 482-484), could be omitted without serious loss. The space devoted to topics like these, which receive adequate treatment in more advanced courses, might well be given to more expanded discussion of more elementary topics; for example, *amalgams* are disposed of in one and one-half lines (page 471); the postulates of the *ionic theory* (pages 178-179), *valence* (pages 85-87), and *molecular weights* and *atomic weights* (pages 116-121), are too briefly treated to be understandable without considerable expansion in the classroom.

Certain points, some of them minor, seem to the reviewer to call for adverse criticism: *The modern atomic theory* (pages 21-24) in no way resembles the atomic theory of Dalton and should rather be named the *theory of atomic structure;* the figure showing the union of sodium and chlorine atoms to form sodium chloride (page 23) is a misleading representation of the process and of the product; the structural formula shown for sulfuric acid (page 93) implying that its structure is ionic is almost certainly incorrect; the mechanism of the ionization of hydrochloric acid (page 93) is no longer acceptable; the implication that an *ion pair* of Na^+Cl^- corresponds to a "practical molecule" (page 184) seems unfortunate; the treatment of *normal solutions* (page 134) is hopelessly inadequate and, in the case of cupric sulfate, misleading; the eradication from the student's mind that the equivalent weight of a substance is the molecular weight divided by the valence of the cation is one of the really difficult tasks of the instructor in the later course in quantitative analysis; the term *effective fraction ionized* (page 190) doesn't aid the student in his future chemistry studies; the values of the standard electrode potentials of the metals shown on page 483 are those for *molal* solutions of their ions, not *normal* solutions as stated. On page 194 the statement is made: "This (H_3O^+) is cumbersome and should be understood rather than written. We do not trouble to tell the truth about the blue cupric ion, $Cu(H_2O)_4^{++}$...". The reviewer does not agree: The formation of H_3O^+ is probably an essential part of the ionization of any acid in aqueous solution; writing the hydrated cupric ion is rarely necessary to explain its reactions. In general, in the opinion of the reviewer, the treatment of fundamental chemical theory and laws and of the ionic theory is much below the level of excellence characterizing the rest of the book. The latter hardly represents up-to-date teaching of the subject.

The type and make-up of the book are good and the text remarkably free from typographical errors.

Other Publications

GLASS FACTORY YEAR BOOK AND DIRECTORY, 1946 edition, has been issued by the *American Glass Review*, Century Bldg., Pittsburgh 22, Pa. It is a handy compendium for those in industries supplying the glass industry as well as for those in the industry itself. It contains complete data on all manufacturers of glass products in the United States and Canada; classifications of glass products; and indexes of raw materials and equipment, finished products, and manufacturers. Valuable, too, are the statistics on production, raw materials, and foreign trade, technical information, and the addresses and officers of leading trade associations. 192 pp., $5.00.

FORMALDEHYDE is the subject of the first chemical safety data sheet to be issued by the Manufacturing Chemists' Assn., 608 Woodward Bldg., Washington 5, D. C. These sheets are designed for supervisory staffs and management, presenting in concise form essential information in the handling and use of the chemical product. Price per copy 15¢.

A BUSINESS OF MY OWN, by Arthur E. Morgan, who is well known for the "work and study" program he introduced at Antioch College while he was its president, discusses objectively the possibilities of occupations and industries, particularly in the small community. The author has tried to deemphasize grocery stores, filling stations, and the like, of which there are usually enough in a community, and has stressed the less common occupations and professions, pointing out, for example, the opportunities offered to a chemist or chemical engineer in a small town. Not only are the various occupations described and evaluated, but a third of the book is devoted to a general consideration of business itself. Published by Community Service, Inc., Yellow Springs, Ohio. Price, $1.

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BOOKLETS & CATALOGS

Chemicals

A941. ALKALI CLEANERS. "Method of Evaluating Alkali Cleaners" titles a 4-page booklet of Nielco Laboratories.

A942. CHEMICALS. The A. R. Maas Chemical Co. has issued a new catalog concerning their phosphate and photographic chemicals.

A943. CHLORINATION. A 50-page book of instructions on uses of Perchloron, high test calcium hypochlorite, is now available from the Pennsylvania Salt Mfg. Co.

A944. DDT. A chart showing the compatibility of DDT with various other materials has been prepared by Geigy Co., Inc.

A945. EPICHLORHYDRIN. The Shell Chemical Corp. has announced the availability of a 13-page booklet on this new chemical intermediate.

A946. HYDROCARBONS. The Chemical Products Department of the Phillips Petroleum Co. has just issued a 110-page booklet giving the properties and specifications of the various hydrocarbons which they manufacture.

A947. LATEX ANTIOXIDANT. A one-page leaflet, describing Aminox, a latex antioxidant, is available from the Naugatuck Chemical Division of the United States Rubber Co.

A948. LATICES. Dispersite, water dispersed rubber or resin, is the subject of a 4-page bulletin (No. D) of Dispersions Process, Inc.

A949. MERCERIZATION. "Methods for the Study and Control of Mercerization" titles a booklet of Dexter Chemical Corp.

A950. MERCERIZATION. "Mercerizing and Alkamerce—The Ideal Dry Mercerizing Penetrant" titles a recent 8-page bulletin of the Hart Products Corp.

A951. MERCERIZATION. "A Study of the Mercerization Process" titles a booklet of the Textile Chemical Division of the Dexter Chemical Corp.

A952. ORGANIC CHEMICALS. Catalogs. Columbia Organic Chemicals Co., Inc.

A953. PLASTICS. "One Plastics Avenue" titles a recent 20-page booklet which is available from General Electric Co.

A954.* PLASTICS. The Celanese Plastics Corp. has just issued an 88-page bulletin entitled "Molding with Lumarith". Inquiry must be on business letterhead.

A955.* PLASTICS. "Celanese Synthetics for the Electrical Industry" titles a 20-page bulletin available from Celanese Plastics Corp. Inquiry must be on business letterhead.

A956. PROTECTIVE COATINGS. "Organic Protective Coatings and Their Performance on Electrolytic Tinplates" is the subject of a folder of Watson-Standard Co.

A957. RESINS. Price schedule. U. S. Industrial Chemicals, Inc.

A958. RESINS. "Resins for Textiles" titles a new textile finishing bulletin (No. 113) announced by the Textile Resin Department of the American Cyanamid Co.

A959. RUBBER LATEX. The Naugatuck Chemical Division of United States Rubber Co. has just issued a 4-page folder describing Lotol, a compound latex.

A960. TRYPTOPHANE. "Recent Research on Tryptophane" (3rd edition) titles a recent 16-page booklet of the Special Chemicals Division of Winthrop Chemical Co., Inc.

Equipment

F734. CONTINUOUS CENTRIFUGES. The CME continuous centrifuge of Centrifuge Mechanical Equipment, Inc. is the subject of a recent 4-page folder.

F735. SIPHON. Speare's safety siphon is pictured and described in a recent 4-page bulletin attainable from The Alden Speare's Sons Co.

F736. SPRAY DRYERS. "The Advantages of a Table Model Laboratory Spray-Dryer" titles a recent 4-page bulletin of Bowen Engineering, Inc.

F737. SPRING HANGERS. The Blaw-Knox Co. has issued a new 36-page catalog (No. 2026) describing their functional spring hangers and vibration eliminators.

F738. STAINLESS STEEL. Type 416, a free machining chromium stainless steel, is described in a 4-page bulletin of the Allegheny Ludlum Steel Corp.

F739. STAINLESS STEEL. Types 347 and 321 of Allegheny metal are described in a recent 4-page bulletin of the Allegheny Ludlum Steel Corp.

F740. STAINLESS STEEL BELLOWS. "CMH Stainless Steel Bellows" titles a recent 12-page booklet available from Chicago Metal Hose Corp.

F741. STAINLESS STEEL CASTINGS. "Allegheny Metal Castings" titles an 8-page bulletin available from Allegheny Ludlum Steel Corp.

F742. STEAM PLATENS. The new Lukens steam platens are pictured and described in a 4-page folder of the Lukens Steel Co.

F743. TUBULAR INSPECTION. The Shell Development Co. has an 8-page catalog describing the Probolog, a new instrument for the inspection of tubular equipment.

F744. WELDING LENSES. The Eastern Equipment Co. has issued a new 4-page folder (No. AWP-21) titled "Amcoweld Lenses for Industrial Eye Protection."

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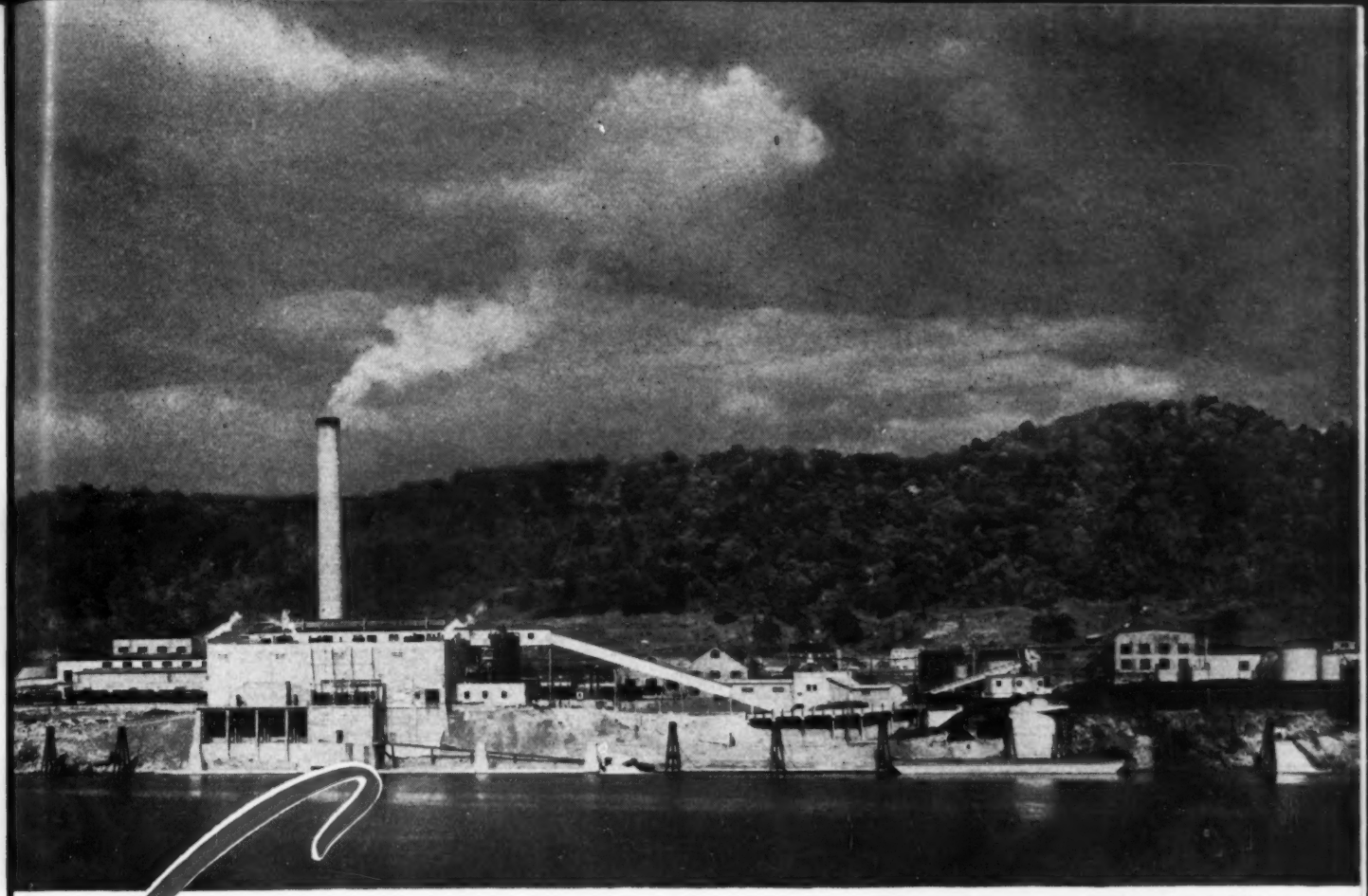

Photo—Gottscho-Schleisner

Columbia buys Natrium, W. Va. Plant

The chlorine-caustic soda plant at Natrium, W. Va., has just been added to Columbia's facilities.

Built and operated by Columbia for the Defense Plant Corporation, the Natrium Plant bids to be a major factor in serving peacetime industry just as it was in producing gigantic quantities of chlorine and caustic soda for critical war industries.

This important plant, added to the facilities at Barberton, Ohio, and Corpus Christi*, Texas, is a step in Columbia's expansion program planned to meet the demand of industry for these essential chemicals.

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NEWS OF THE MONTH

Coal Strike Hits Chemical Output

WITH coal not only a source of power for chemical operations, but also a vital raw material for the production of many chemicals, as well as a source of processing steam, the recent strike dealt a severe blow to the industry.

Most chemical plants had no more than a thirty day inventory of coal when the strike began, and by mid-May many important producers had to drastically curtail operations, or close functioning units completely. The two week truce did little to alleviate the situation, and the ensuing rail tie-up still further aggravated conditions. The immediate effects are evident; the longer-term prospects darkened. For the various divisions of the industry are so inter-related that a shortage in any one field automatically affects other production phases.

Naturally, the coal tar chemical producers were among those most severely hit. With coke oven operations limited, mere token quantities of ammonium sulphate moved from the mills with more than 100,000 tons of output lost. A few months ago the steel strike pared 124,000 tons from producer's quotas, and although the peak period for the shipment of fertilizer is past, compounders foresee stringent supply conditions existing well into the fall.

Sharp cutbacks in the production of phenol, cresylic acid, naphthalene, phthalic anhydride, and such coal-derived chemicals, also points up future difficulties for those industries dependent upon such items for further processing. Repercussions, of major import, are anticipated in the pharmaceutical, dyestuff, insecticide, and plastics industries.

Although a stringent market has long existed in these commodities, chemical circles regard the present circumstances as among the worst of recent years. Makers of agricultural insecticides and fungicides are particularly disturbed, for with the growing season well advanced they hold but slim hope of any but the most essential needs being met this year.

Too, domestic demand for pharmaceuticals is at an unprecedented high level, and export inquiries are several times prewar peaks. Dyestuff manufacturers also face a similar situation, with heavy backlogs of orders and a seemingly insatiable world-wide demand. Both industries fear added production difficulties within the next few months.

The burgeoning plastics industry which has freely admitted that output would fall far short of consuming needs during 1946, views the development of a still tighter market as inevitable, as a direct result of the coal strike. Apart from the plastics directly affected—such as phenol-formaldehyde—a bottleneck in plasticizers looms—which threatens fabric coaters.

Several alcohol distillers, plagued for years by molasses and grain shortages, and further burdened by the limited availability of coal, were forced to close producing units. With industrial alcohol needs placed at upwards of 150 million gallons this year, there is now little prospect of the supply-demand picture approaching any kind of a balance for at least six months. Synthetic producers are running at 65 million gallon a year capacity, and heavy withdrawals will have to be made from government alcohol stockpiles if normal needs are to be even approximately met.

Alkali output was likewise cut back as coal-generated electricity shortages developed Superimposed on the deficiency in supplies which has existed for the past year, processors are not hopeful of any substantial easing in the market during 1946.

Apart from production difficulties which have arisen, and will arise, within the chemical industry itself, as a result of the coal strike, markets have been upset as consuming plants have been crippled, and normal channels of trade disrupted.

Production output estimates made by the industry early this year have been revised, and the easing of many commodities, which was in prospect as full peacetime production resumed, has now faded or been deferred for some months.

Hold Ethylene Oxide Patent Invalid

All claims of the second reissue (No. 22,241) of the Lefort patent (U. S. 1,998,878) assigned to Carbide and Carbon Chemical Corp., were declared invalid in the U. S. District Court on May 15. The decision arose out of a suit between Carbide and U. S. Industrial Chemicals, Inc.

Basis for the judgment was the contention of insufficiency of specifications.

WAA Sells All Surplus Toluene

The Government's stocks of surplus toluene have been completely cleared out.

Late in April the War Assets Administration offered 11,200,000 gallons of surplus toluene at 10¢ per gallon, with minimum orders to be in tank car lots.

By May 13, closing date of the sale, WAA had received orders for 45,000,000 gallons, more than four times the amount offered.

The oversubscription has resulted in an allocation to buyers as follows:

Orders for 50,000 gallons or less will receive one tank car.

Orders for more than 50,000 gallons will receive 20 per cent of the amount ordered.

Bowen Joins Celanese Chemical

Kenneth D. Bowen has joined Celanese Corp. as plant manager of its Bishop, Texas, chemical unit. Mr. Bowen, with Dow Chemical for seventeen years, held a similar post at its Velasco, styrene project.

German Patent Data Made Available

Ten tons of documents taken from the German Patent Office are now being sorted and evaluated and will eventually be disseminated for the benefit of American science and industry, Casper W. Ooms, Commissioner of Patents, states.

Prior to 1939 patent information was regularly exchanged between Germany and this country, since then, however, thousands of German patents have been issued of which we have no knowledge. It is this file of patents issued during the war that is of particular interest to the United States Patent Office, and many of these patents will be placed on file in the Patent Office search room for public use.

At the same time OPB will bring the documents to the attention of the Amer-

ican public. Each document selected as worthwhile will be abstracted and listed in OPB's weekly "Bibliography of Scientific and Industrial Reports," which is available on subscription from the Superintendent of Documents.

Gall Promoted by Pennsalt

John F. Gall has been appointed assistant research supervisor of Pennsalt's Whitemrash Research Laboratories. Dr. Gall will be mainly concerned with the coordination of the experimental activities of the research and development department.

Titanium Pigments Case To Higher Court

The Supreme Court of the United States has agreed to review the decision of the United States District Court for the Southern District of New York holding E. I. duPont de Nemours & Co. and the National Lead Company guilty of violating the anti-trust laws in the production of titanium pigments.

Both sides had appealed to the supreme court for review of the decision. The Department of Justice sought a review contending that the penalties imposed by the lower court were not harsh enough. The defendant companies argued that the conviction was in error because the contracts were a "reasonable exercise of patent rights" and were not a violation of the law.

Limitations Set on Alcohol Use

Severe restrictions on the consumption of industrial alcohol, together with an allocation of products from which alcohol is made, has been ordered by the Office of War Mobilization and Reconversion, in an edict forwarded to the CPA and Dept. of Agriculture.

Under the terms of the OWMR ruling, consumption of ethyl alcohol during 1946 is to be limited to 150 million gallons, including antifreeze. Butyl alcohol consumption is to be held to 150 million pounds, while some 20 million gallons of ethanol is to be channelled to synthetic rubber producers.

On the raw material side of the picture, blackstrap molasses from Cuba is to be allocated as follows: 37 million gallons for ethanol; 18 million gallons for butyl. Exports, mainly to Great Britain will amount to 85 million gallons, and allocations for feed will total 10 million.

The gap between permitted consumption of 150 million gallons of ethanol, and the allocation of 37 million gallons of blackstrap to the industry is to be filled in part from the Government stockpile of some 70 million gallons, and from petroleum-based output, estimated as 65 million gallons. In addition, 20-30 million gallons of Cuban alcohol may be imported. A further condition is that the Dept. of Agriculture is to provide 8 million bushels of corn to the ethyl program, if the government stockpile falls below 20 million gallons by Sept. 1.

Monsanto Institutes Academic Leave System

To encourage the scientific work and development of technical personnel in physics, chemistry, and engineering, Monsanto Chemical Co., St. Louis, has recently inaugurated a system whereby academic leaves of absence will be granted to selected staff members. The awards will be made on the basis of especially meritorious service and outstanding performance while in the service of the company, and will cover a full academic year of post-graduate study.

The recipient will receive full salary during the course of his graduate studies at any institution, and on any subject, of his own choosing. He is guaranteed relocation after completion of the year-long academic leave in a position at least equal to that previously held.

The number of awards is to be decided by the executive committee every year, with four to be granted for the academic year 1946-47.

Rosin Export Curbs To Be Maintained

To safeguard rosin supplies for domestic housing and reconversion needs, exports will be held to 250,000 drums for the six-month period ending Sept. 30, 1946, John D. Small, administrator of the Civilian Production Administration, has announced.

This export ceiling will prevail, Mr. Small said, even though rosin production in this country may exceed demand during the second and third quarters of this year.

Fertilizer Manufacturers Plan Expansion

Fertilizer manufacturers are planning expansion programs to meet growing demands for their products, The National Fertilizer Association states, on the basis of reports from members. Plans as reported by various firms, call for new capacity ranging from 10 per cent to 65 per cent of their present facilities.

Since the beginning of the war, the NFA said, manufacturers have been confronted with a succession of difficulties, hampering the execution of building programs. Limitations on the use of building materials and shortages of such materials, labor and transportation have retarded construction activities.

Nevertheless, through increases in the use of labor-saving devices, overtime work and other measures, fertilizer production has steadily mounted. In 1945, output stood at 13,200,000 tons of fertilizer as compared with 7,707,278 tons in 1939. The 1945 consumption was almost 80 per cent greater than in the average of the five-year period 1935-1939.

Building programs would extend over a period of from one to three years. Some companies have worked out plans for installation of new machinery in established units. Other concerns are planning additional storage space important in enabling them to build up their stocks of materials. Still others are planning arrangements for moving finished products out of their plants over a longer period than the normal "shipping season." This project would call for further cooperation of farmers in buying and storing fertilizer in off-season months.

Yohe Promoted to Presidency

Robert V. Yohe has assumed the presidency of American Anode Inc., to succeed Burton F. Stauffer, retired. Dr. Yohe joined Anode's parent B. F. Goodrich Co. in 1931 as a research chemist.

Streptomycin Production Program Progresses

Output of streptomycin, which amounted to 23,496 grams in February, 26,340 grams in March, and 27,100 grams in April, is expected to approximate 29,750 grams in May. Nevertheless, although an increasing proportion of the limited supply is

being granted on civilian appeals, the present method of distribution must be continued for some time.

However, the expansion program is progressing rapidly and within a few months should be capable of accommodating all military requirements. Thereafter, limited quantities will be made available for commercial distribution, and for the more complete appraisal of the antibiotic's worth therapeutically.

Heads Export Sales

Frank T. Shanahan, a major with the U. S. Army for the past four years, has been appointed manager of the export sales division of Innis, Speiden & Co. He will be headquartered in New York.

Standard Oil Patent Held Invalid

A patent held by Standard Oil Co. of California on a process for removing sulfur from gasoline has been held invalid in the United States Circuit Court of Appeals.

California Standard had appealed from a decision of the United States District Court of Delaware in its suit against Tide Water Associated Oil Co. for an injunction and damages for alleged infringement of the patent.

Reveal Synthetic Wax Production Method

New methods developed by the Germans for production of waxes involved continuous polymerization of ethylene, using methanol as a carrier for the catalyst, according to a report by the Department of Commerce's office of the publication board. One I. G. Farbenindustrie plant, polymerizing at 200 atmospheres, produced ten tons of wax per month for use in shoe polish, and another, working at 1,000-2,000 atmospheres, produced an unusually elastic wax with excellent electric properties, according to the report.

It was found that ethylene of 98 per cent strength could be used for polymerization without further purification.

CALENDAR *of* EVENTS

AMERICAN CHEMICAL SOCIETY, semi-annual meeting, Chicago, Sept. 9-13.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, western convention, Palace Hotel, San Francisco, Aug. 25-28.
AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS will celebrate its 75th anniversary at the Waldorf-Astoria, New York, September 16-18, 1946.
AMERICAN PHARMACEUTICAL MANUFACTURERS' ASSOCIATION, annual convention to be held jointly with Canadian Pharmaceutical Manufacturers' Association, Lake Louise, Alta., Canada, June 10-12.
AMERICAN SOCIETY FOR TESTING MATERIALS will hold the 49th annual meeting in Buffalo, N. Y., June 24 to 28, 1946.
CANADIAN CHEMICAL CONFERENCE, annual meeting, Royal York Hotel, Toronto, June 24-26.
NAIDM, mid-year meeting, French Lick Springs Hotel, French Lick, Ind., June 17-19.
NATIONAL CHEMICAL EXPOSITION will be held at the Chicago Coliseum, Sept. 10-14.
NATIONAL FERTILIZER ASSOCIATION, annual convention, French Lick Springs Hotel, French Lick, Ind., June 10-12.
ANNUAL INSTRUMENTATION CONFERENCE and Exhibit, Hotel Wm. Penn, Pittsburgh, Sept. 16-20.

Calco Creates New Research Posts

Cyanamid's Calco Chemical Division has recently established new positions as a means of recognizing outstanding ability for individual research with the creation of its Research Fellow Category. The position affords the opportunity for properly qualified scientific personnel to concentrate on research without the handicaps imposed by administrative responsibilities.

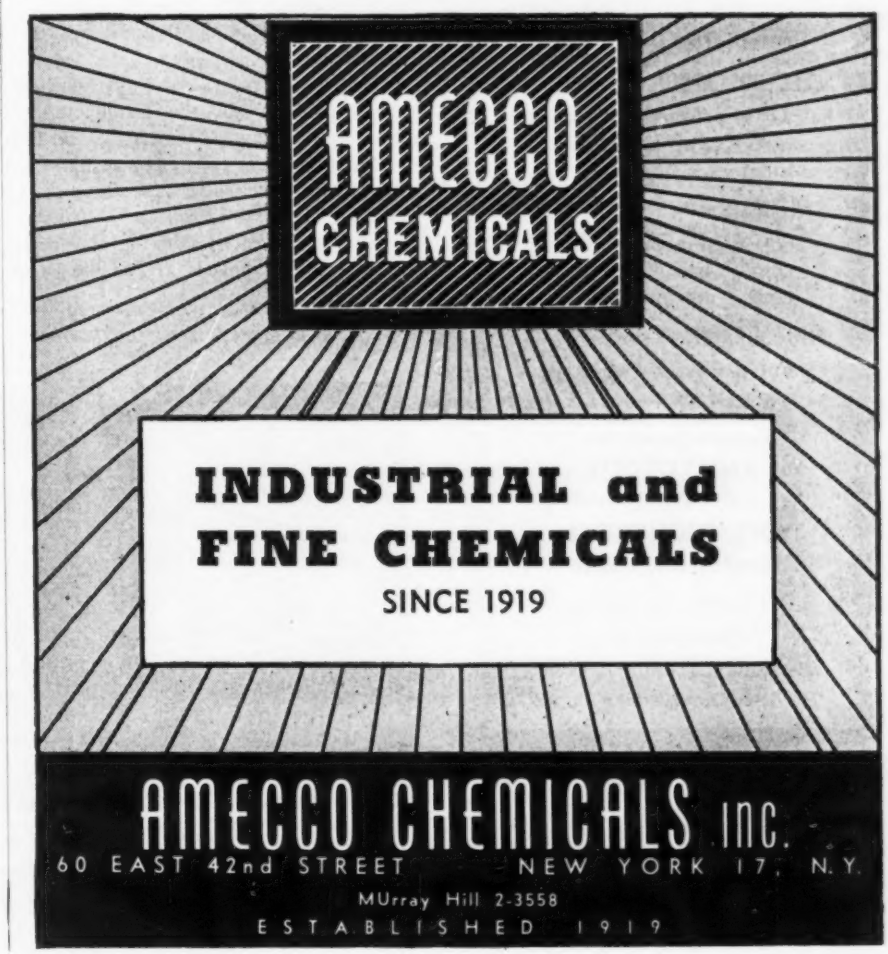
The plan denotes a broadening of the program which Calco instituted in January, 1944, by which the company established the position of Research Associate to recognize high scientific attainments and wide experience in both the prosecution and direction of research. Such Associates were relieved of responsibilities attendant on the administration of a regular unit of research in order to be available for more important special assignments.

The Associate and Fellow positions correspond roughly with comparable executive positions in research direction, and research supervision, respectively.

Penicillin Output At New High

Penicillin must be continued under allocation despite a 40 per cent increase in production of the antibiotic during the first quarter of 1946, members of the Penicillin Industry Advisory Committee and CPA officials agreed recently.

Although first quarter production totaled 4667.33 billion units—equal to about two-thirds of the entire 1945 output—industry members feel that penicillin should remain under allocation controls until it is possible to supply the full needs of the export market without disturbing the domestic supply situation. Foreign demand has climbed steadily, with dollar value of overseas shipments of penicillin



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SODIUM ACETATE

is made especially for

- **RUBBER COMPOUNDING**
  It will prevent scorching by holding back the cure up to 240° F. but does not interfere with vulcanization.
- **TANNING**
  For the removal of insoluble calcium salts during tanning to produce a tear resistant flexible leather. For neutralizing pickled skins in chrome tanning to give amazingly short tanning periods.
- **DYESTUFFS**
  For the preparation of diazo compounds in developing azo colors.
- **BUFFERING**
  Against strong acids as in corn syrup refining.
- **ELECTROPLATING**
  To improve the anode efficiency at low temperatures.
- **SYNTHESIS**
  Of coumarin, cinnamic acid, azo chloramide, benzyl acetate, etc.
- **PHOTOGRAPHY**
  For dry fixer and hardening powders.

ANHYDROUS
and
60% TECHNICAL
Grades Available

3 Pounds Anhydrous
equivalent to
5 Pounds Technical 60%

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NIACET
CHEMICALS DIVISION
UNITED STATES VANADIUM CORPORATION
Sales Offices
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amounting to $5.5 million in April, or almost five and one-half times the average monthly total of all drugs and medicines exported by the U. S. in 1938.

Chemicals Wanted

The following chemicals are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 33rd, Federal and Dearborn Sts., Chicago 16, Ill:

Dioleyl Maleate
Ethyl aluminum iodide
Ethylene sulfide
2-Amino-1,4-naphthoquinone
2,4-Toluene diisocyanate
Calcium trithiocarbonate
Ferrous thiosulfate
Potassium tetra- and pentathionate
Cetyl stearyl sulfate
tert-Butyl amine
1,8-Dihydroxy-3-methoxy anthraquinone
2,6-Dihydroxybenzoic acid
Carbamyl chloride
o-Ethyl phenol
1,2-Naphthalene diisocyanate
Lutein
Hexachloracetone
Thymoform
Guaiaconic acid
Sodium stannichloride

COMPANIES

Plan Acetylene-Based Chemical Unit

General Aniline and Film Corp. has begun construction of a $1,250,000 plant at Grasselli, N. J. for the manufacture of chemical products from acetylene by means of high pressure techniques. It is anticipated the new unit—the first such semi-works pilot plant project in the U. S.—will be completed this fall, and will permit limited commercial production of vinyl ethers, their derivatives and polymers, as well as of alkinols and their derivatives.

The new plant will also provide additional facilities for the manufacture of koresin synthetic rubber tackifier and Polectron (polyvinyl carbazole) resin, which the company already manufactures by pressure acetylene processes.

Main indicated uses of the new group of acetylene chemicals are as intermediates for pharmaceuticals, plastics, solvents, plasticizers, and coating compositions.

Westvaco Charts Expansion Program

Westvaco Chlorine Products Corp. anticipates that both the units it has under construction at Carteret, N. J. and Charleston, N. C. will be in production by the latter part of this year. According to President William B. Thom, these developments represent but the initial step in an $8 million expansion program drafted for the next few years.

The Carteret facilities will be devoted mainly to expanding output of sodium phosphates, but the possibility of manufacturing potassium phosphates is also being considered. Hitherto, such potassium salts have not received much industrial attention, in view of their higher price. However, large scale output and lowered costs might permit the development of wider use, particularly in liquid soap.

At Charleston, Westvaco plans the production of benzylchloride, benzaldehyde, and other toluene derivatives.

Du Pont Extends Organic Research Laboratory

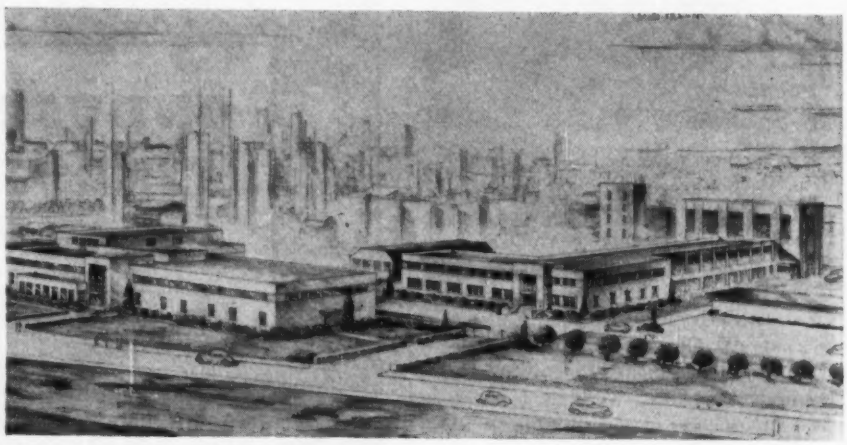
Construction of a $600,000 addition to Du Pont's Jackson Laboratory, Deepwater Point, N. J., will begin soon, according to J. M. Tinker, director.

The new section to Du Pont's organic chemical research facilities will be a two and one-half story, reinforced concrete building, 216 feet by 52 feet.

Pfizer Acquires Additional Facilities

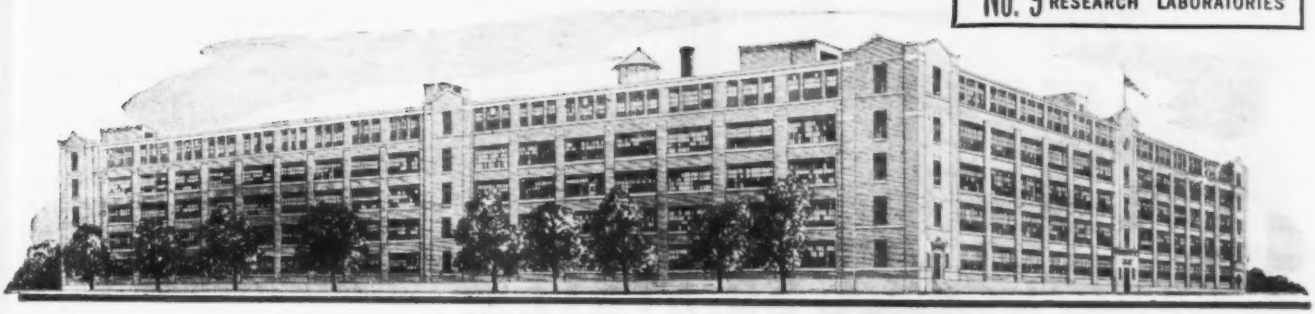
Charles Pfizer & Co., Inc., Brooklyn, has purchased the "Victory Yard" in Groton, Conn., from War Assets, and

New Research Laboratories



Sketch of the $2 million laboratory facilities planned by California Research Corp., Richmond, Cal. As a subsidiary of Standard Oil of California it will function as the research center of the parent company, and its affiliate, Oronite Chemicals.

No. 9 OF A SERIES FROM CYANAMID RESEARCH LABORATORIES



Now...1 Molecule

Combining Alcohol and Nitrile

AERO* ETHYLENE CYANOHYDRIN

$HO\text{-}CH_2\text{-}CH_2\text{-}CN$

This new compound combines the chemical and physical properties of alcohol and nitrile, producing an intermediate that can be used for the production of many other organic chemicals. Among those you can prepare, the following are typical; however, samples are not available at the present time.

β—hydroxy propionic acid, its salts and esters

$HO\text{-}CH_2\text{-}CH_2\text{-}COOH$
$HO\text{-}CH_2\text{-}CH_2\text{-}COOMe$
$HO\text{-}CH_2\text{-}CH_2\text{-}COOR$

β—chloropropionitrile and derivatives

$Cl\text{-}CH_2\text{-}CH_2\text{-}CN$
$Cl\text{-}CH_2\text{-}CH_2\text{-}CONH_2$
$Cl\text{-}CH_2\text{-}CH_2\text{-}COOH$

Propanol amines

$HO\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}NH_2$

Possibilities as a Solvent

The presence of hydroxyl and cyano groups makes this compound potentially valuable as a solvent. It is soluble in water, acetone, ethanol, chloroform and diethyl ether, and can be used as a solvent for many inorganic salts. This may be valuable in solvent extraction operation.

Properties

Aero Ethylene Cyanohydrin is a straw colored liquid, 96-98% pure, and weighs 8.7 pounds per gallon. The boiling point is 227-8°C. (with decomposition). Under reduced pressure it can be readily refluxed or distilled without decomposition at neutral pH's. It is available for immediate delivery in commercial quantities.

If you have a problem in the field of organic nitrogen chemicals, call or write us. Address Section ON, Synthetic Organic Chemicals Department, American Cyanamid & Chemical Corporation, 30 Rockefeller Plaza, New York 20, N. Y.

Other Organic Nitrogen Chemicals

Acrylonitrile	$CH_2=CH\text{-}CN$
Guanidine compounds	$H_2N\text{-}C(=NH)\text{-}NH_2$
Guanylurea sulfate	$(H_2N\text{-}C(:NH)\text{-}NH\text{-}C(:O)\text{-}NH_2)_2H_2SO_4$
Glycolonitrile	$HO\text{-}CH_2\text{-}CN$
Lactonitrile	$CH_3\text{-}CHOH\text{-}CN$
Dicyanidiamide	$H_2N\text{-}C(:NH)\,NHCN$

*Reg. U. S. Pat. Off.

AMERICAN Cyanamid AND CHEMICAL CORPORATION

A Unit of American Cyanamid Company

FREE SAMPLES AND TECHNICAL DATA

American Cyanamid & Chemical Corporation,
Section ON, Synthetic Organic Chemicals Dept.,
30 Rockefeller Plaza, New York 20, N. Y.

Gentlemen:

☐ *Rush my sample of Aero Ethylene Cyanohydrin*

☐ *Rush copy of technical data sheet*

*Name*_____

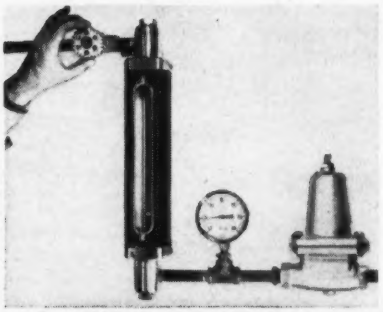
*Position*_____

*Company*_____

*Address*_____

HEADQUARTERS FOR NITROGEN CHEMICALS

An ANSUL Fingertip Control SO_2 SYSTEM



Install an Ansul SO_2 System and get these Proved Advantages

FINGER-TIP CONTROL—Easy, positive, finger-tip control providing extreme accuracy for reaction or adjustment of pH.

GREATER ECONOMY—Small investment in equipment, materially reduced operating and maintenance costs, and freeing of valuable floor space.

HIGHER PURITY—Elimination of impurities inherent in burner gases (Ansul Liquid SO_2 is 99.9+% [by weight] PURE).

GREATER SOLUBILITY—Solubility in water is 4 to 5 times greater than SO_2 from burner gas.

Easy to Install... Easy to Operate

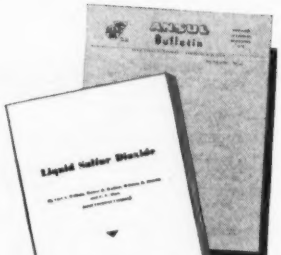
WRITE THE ANSUL TECHNICAL STAFF FOR FURTHER INFORMATION

LIQUID Sulfur Dioxide ANSUL

PHYSICAL PROPERTIES

Chemical formula	SO_2
Molecular weight	64.06
Color (gas and liquid)	Colorless
Odor	Characteristic, pungent
Melting point	−103.9° F. (−75.5° C.)
Boiling point	14.0° F. (−10.0° C.)
Density of liquid at 80° F.	(85.03 lbs. per cu. ft.)
Specific gravity at 80° F.	1.363
Density of gas at 0° C. and 760 mm.	2.9267 grams per liter (0.1827 lb. per cu. ft.)
Critical temperature	314.82° F. (157.12° C.)
Critical pressure	1141.5 lbs. per sq. in. abs.
Solubility	Soluble in water
Purity	99.9+% (by wt.) SO_2 (H_2O less than 0.01%)

*REG. U. S. PAT. OFF.



Send for Bulletin 020.1, "A Comparison of Ansul SO_2 and Sulfur Burner Gas," and also for your copy of "Liquid Sulfur Dioxide"—a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide—written by the Ansul Technical Staff.

WRITE: Dept. B.

ANSUL CHEMICAL COMPANY
INDUSTRIAL CHEMICALS DIVISION, MARINETTE, WIS.
Eastern Office: 60 E. 42nd St., New York City

plans to adapt the unit to the production of food, technical and medicinal chemicals.

During the war the plant was operated by the Electric Boat Co. in the construction of submarines.

The property, located on the bank of the Thames River, Groton, consists of 28 acres. In addition, Pfizer has an adjacent 48 acres under option.

Present plans call for the initial construction of a powerhouse and the renovation and extension of existing buildings.

Calco Promotes Eberhart

Dale R. Eberhart, graduated from Ohio State in 1935 and with Calco since that time, has been advanced to the post of Research Fellow by M. L. Crossley, research director.

Reichhold Plans Major Expansion

Reichhold Chemicals, Inc., has authorized an expansion program involving an additional investment of $10 million for the increased production of phenol-formaldehyde, resorcinol, and maleic resins, together with chemical colors and pigments, according to Henry H. Reichhold.

Included in the program is a plant for the conversion of synthetic methanol to formaldehyde at Tuscaloosa, Ala., as well as the expansion of the company's phenol unit in that locality. Two chemical color and pigment plants have already been started, one at Tuscaloosa and the other near San Francisco.

Government-imposed restrictions on industrial construction have delayed full implementation of plans, Mr. Reichhold states.

Lilly Purchases Additional Facilities

Eli Lilly & Co. has purchased the government-owned facilities and the Stokely Foods buildings at West Morris St. and Kentucky Ave., Indianapolis. These were formerly used by the Curtiss-Wright Propeller Division.

To be known as Lilly's Kentucky Ave. plant, these buildings cover twenty-six acres, and include a five-story reinforced

concrete manufacturing building, two one-story units, as well as two office buildings and power plants.

They will provide an additional million square feet of usable floor space, which will be ready for utilization by January.

Celanese Proceeds With Plastics Expansion

Celanese Corp. of America has received CPA approval for the construction of an addition to its Belvidere, N. J. plastics plant, and anticipates that construction will begin about July 1. The project is at present four months behind schedule, due to delays encountered in acquiring title to the property from RFC.

It is planned to produce both cellulose acetate and cellulose propionate molding materials in the new unit, with initial production at one of the existing buildings scheduled for November. Full scale operations—which will double Celanese's molding powder capacity—will not be realized until mid-1947.

New Chemical Concern Organized

Cyclic Chemical Corp., a new organization to manufacture and market such products as silica gel, zinc ammonium chloride fluxes, core oils, emulsifiers, wetting agents, and aromatic hydrocarbons, has been formed by Paul R. Eisenhuth and Wallace F. Helies. Both men were formerly executives of the Velsicol Corp.

Main offices are at 75 E. Wacker Drive, Chicago, with plans calling for the establishment of branches in New York and Washington.

Dow Re-Opens Magnesium Unit

Dow Chemical Co. plans immediate resumption of magnesium production at its sea water plant at Freeport, Tex., which has been closed since the end of the war.

Production is expected to reach full capacity by midsummer.

The company will consolidate magnesium operations under a separate executive board. Dr. Dow will act as chairman and J. D. Hanawalt, former director of metallurgical research, will be general manager of the new division.

New Du Pont Plastics Plant

E. I. Dupont de Nemours & Co., Inc., will begin construction of its new plastics plant at Washington Bottom, near Parkersburg, W. Va., within the month, according to Arnold E. Pitcher, general manager of the Plastic Dept.

This unit—Du Pont's third plastics project—will be devoted to the manufacture of Lucite (acrylic resin), and polythene molding powders, as well as nylon bristles and molding compositions. Initial operation is scheduled for next summer.

Furfural—on the THRESHOLD OF CHEMICAL PROGRESS...

To the chemist of today Furfural and the other available Furans offer the same opportunity for chemical discovery as did benzene seventy years ago. For many years chemical industry has neglected Furfural and its derivatives, primarily because they frequently did not behave in the manner which would have been predicted from consideration of the ring substituent. Chemists are now beginning to realize that this unorthodox behavior might open up interesting and valuable developments.

In the meantime the physical properties of Furfural, such as its preferential solvent action on unsaturated compounds, its effectiveness as a dispersant, as a wetting agent and bactericide have so extended its use and reduced the cost of manufacture that Furfural is the cheapest pure aldehyde available today.

Because of its low price and because of its chemical activity which is a function of both the unsaturated ring and the aldehyde group, chemists will find it worth while to work with Furfural. Samples of Furfural will be gladly furnished when requested on your business letterhead.

3 *Bulletins*

in a series on the Furans are also available to those interested. They contain interesting and informative data as indicated by the titles:

Bulletin 201
General Information About Furfural.

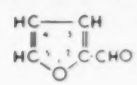
Bulletin 202
Introduction to the Chemistry of the Furans.

Bulletin 203
Physical Data on Furfural.

Bulletin 201 is of general interest to all users of chemicals. Bulletins 202 and 203 contain information of interest primarily to the research worker.

PROPERTIES OF QUAKER FURFURAL

(Furfuraldehyde, C_4H_3O-CHO)
Amber-colored liquid of high stability and unusual purity



Molecular Weight	96.08
Freezing Point, °C	—37
Boiling Range (99%)°C	157 to 167
Specific Gravity (20/20°C)	1.161
Flash Point (open cup)°C	56
Refractive index (20/D)	1.5261
Surface Tension at 20°C (dynes/cm)	49
Viscosity at 38°C (centipoises)	1.35

Solubility: Completely miscible with ethyl alcohol, ether, acetone, benzol, butyl acetate, china wood oil and most organic solvents except petroleum hydrocarbons and glycerol; 8.13% by wt. in water at 20 °C.

Analysis

Furfural, minimum %	*99.5
Water, maximum %	0.2
Organic Acidity, Maximum equiv/l	0.023
Ash, maximum %	0.006
Mineral Acidity	None
Sulfates	None
Ketones	None

*As determined by A.O.A.C. method.

Standard Containers: 9, 45, 90, and 520 lb. Drums
†Carload of Drums 80 to 88 ..... 41,600 to 45,760 lbs.
Tank Car 8,000 gal. ..... 78,000 lbs.
Tank Car, 10,000 gal. ..... 98,000 lbs.
†ODT requires maximum loading
Drums non-returnable

The Quaker Oats Company CHEMICALS DEPT.

1920 BOARD OF TRADE BLDG.,
141 W. JACKSON BLVD., CHICAGO 4, ILLINOIS

FURFURAL • FURFURYL ALCOHOL • FUROIC ACID • TETRAHYDROFURFURYL ALCOHOL

Fanning Opens Office

Frank G. Fanning has opened offices in 50 East Forty-second street, New York, as a sales agent for lanolin and wool grease, as well as for a line of fine and industrial chemicals.

Mr. Fanning recently resigned as a junior partner and sales director of N. I. Malmstrom & Co., lanolin and wool grease refiner, Brooklyn, N. Y., after an association of twenty-six years.

Foote Buys Unit From WAA

The offer of the Foote Mineral Company to purchase the lithium salts plant in Philadelphia, which the Foote company operated during the war, has been accepted by the War Assets Administration.

Designed and equipped at a cost of $1,031,396, the Philadelphia property will be sold for $150,000, the offer to cover land and improvements, buildings and machinery.

Diamond Alkali Centralizes Research

Diamond Alkali Co. has revealed plans for establishing a central research and development department and a central engineering department, with quarters for the research and development, to be constructed on a site near Cleveland.

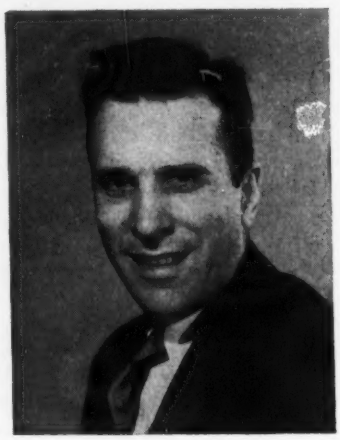
Company Notes

PITTSBURGH CORNING CORP. plans to build two plants at Sedalia, Mo. for the production of glass block and Foamglas. H. K. Ferguson Co., Cleveland, has been named general contractor.

WILLIAM J. HOUGH CO., Chicago, has been appointed sales representative for the chemical division of General Mills Inc. in Wisconsin, Illinois, Michigan, Ohio, Pennsylvania, Indiana and Kentucky. Wisconsin Solvents & Chemicals Co., Ohio Mineral Spirits Co., and Amsco Products Co. will act as distributors in other states.

IMPERIAL CHEMICAL INDUSTRIES LTD., London, plans an expansion of its dyestuffs facilities involving a capital expenditure of some nine million pounds.

Parsekian Joins Martin Plastics



Harold M. Parsekian, formerly with Binney & Smith Co., has joined Glenn L. Martin Co.'s plastics and chemicals division as director of sales and technical service.

NATIONAL RESEARCH CORP., Cambridge, Mass., is constructing a three story extension to its labo atory and office buildings.

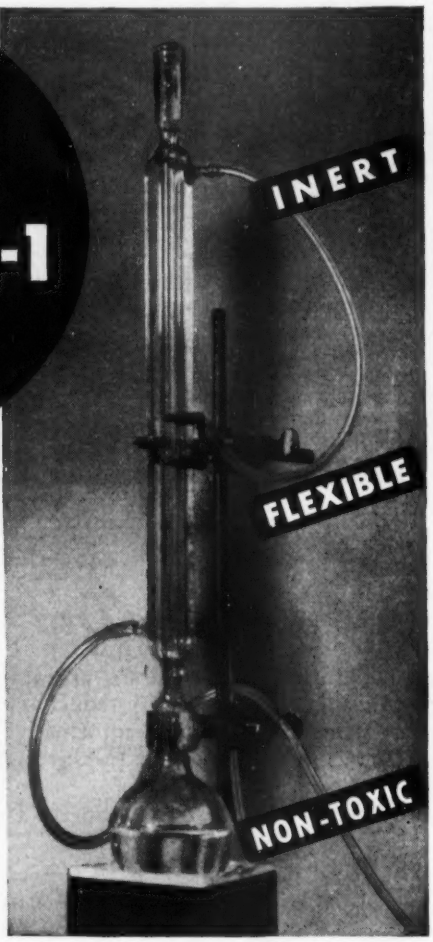
B. F. GOODRICH CO. is planning construction of a $800,000—5000 ton per annum—synthetic rubber unit in Mexico.

PHILIP A. HUNT CO. has opened a west coast branch office and warehouse at 541-543 Ceres Ave., Los Angeles 13, to facilitate distribution of its chemical products to the graphic arts and photographic industries. The new branch will be managed by Leonard F. Eickler.

ORBIS PRODUCTS CORPORATION, 215 Pearl Street, New York City, has moved its Chicago office and warehouse facilities this month to new and larger quarters at 230 West Huron Street, according to Charles J. A. Fitzsimmons, president.

TYGON *Flexible* TUBING S22-1

FOR EVERY LABORATORY NEED



THIS new Tygon Laboratory and Hospital Tubing (compound S22-1) will fit almost every analytical, clinical, biological, surgical or chemical laboratory need. It is clear, for ready visibility of solutions; it is flexible and elastic, for quick connections; it is inert chemically; it is non-toxic; it may be steam sterilized; it will not become brittle or deteriorate with age.

TYGON TUBING (S22-1) CAN BE STEAM STERILIZED:

Of importance to hospitals, biological and clinical laboratories Tygon *Flexible* Tubing (S22-1), even though thermoplastic, can be safely sterilized at 20 lbs. steam for 15 minutes. The tubing should not be kinked during sterilization.

TYGON TUBING (S22-1) IS NON-TOXIC:

All ingredients in Tygon *Flexible* Tubing (S22-1) have been thoroughly tested by independent laboratories and have been found to impart no toxicity to solutions; nor will any of the ingredients leach out or absorb, except when in contact with chlorinated or aromatic hydrocarbons, ketones and esters. Tygon tubing is both odorless and tasteless.

S22-1 HANDLES ALL SOLUTIONS:

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J. Berlage Co., exporters and importers of chemicals, was incorporated last month, and henceforth will operate as J. Berlage Co., Inc. Offices are maintained at 10 E. 40th St., New York 16.

Sharples Chemicals, Inc., moved its New York sales office to the Empire State Bldg., as of May 1st. G. R. Lawson is district manager.

Mathieson Alkali Works, Niagara Falls, plans early construction of a $150,000 pilot plant building. G. P. Vincent, as Mathieson technical director, will supervise pilot plant investigations.

E. I. du Pont de Nemours & Co. is constructing a unit at North Towanda, Pa. for the manufacture of fluoroscopic and intensifying screens. It will be operated by the Patterson Screen Division.

A $400,000 plant and warehouse will be built by Diamond Alkali Company, Pittsburgh, Pa., on a recently purchased 12-acre tract located at 69th St. and South Keeler Ave., Chicago. Actual construction is expected to start in June.

The Buffalo district office of Carbide and Carbon Chemicals Corporation has been moved to the Liberty Bank Building at 424 Main Street, according to an announcement by company officials.

Empire Chemical Corp., 19 Rector St., New York, has moved to larger quarters at 21 West St., N. Y. C. The company's telephone number remains unchanged.

Werner G. Smith Co., a division of Archer-Daniels-Midland Co., has formed a Chemical Products Dept. to be headed by John D. Hetchler in the New York area.

ASSOCIATIONS

Charleston AIChE Elects Officers

At the annual meeting of the Charleston Section, American Institute of Chemical Engineers held May 16 the following officers were elected to serve for the coming year: chairman, R. F. Moran, Westvaco Chlorine Products; vice-chairman, F. A. Otto, E. I. du Pont; secretary, D. J. Porter, Westvaco Chlorine Products; treasurer, J. F. Roe, Monsanto; member-at-large, R. Voorhees, Carbide & Carbon Chemicals.

AIC Names Executive

The American Institute of Chemists elected the following officers at its annual meeting held May 17th at the Hotel Biltmore, New York: president, Foster D. Snell, Foster D. Snell, Inc., Brooklyn, N. Y.; vice president, Joseph Mattiello,

Hilo Varnish Corporation, Brooklyn, New York; secretary (reelected) Lloyd Van Doren, New York, N. Y.; treasurer (reelected) Frederick A. Hessel, Montclair Research Corporation, Montclair, N. J.; councillors, Donald B. Keyes, Heyden Chemical Corporation, New York, N. Y.; Raymond E. Kirk, Polytechnic Institute of Brooklyn, N. Y., and Donald Price, Oakite Products, Inc., New York, N. Y.

Simonds Assumes New Sales Post

Donald Simonds, who returned to Godfrey L. Cabot recently after serving with the Navy, has been named assistant general sales manager. He was assistant manager of the company's special products division prior to the war.

Oil Chemists Elect

New president of the American Oil Chemists' Society, elected at the annual meeting held in New Orleans on May 15-17, is S. O. Sorensen, of the Archer-Daniels-Midland company.

Serving with him for 1946-47 are R. T. Milner as first vice president, Northern Regional Research laboratory, Peoria, Ill.; H. E. Longenecker as second vice president, University of Pittsburgh; C. P. Long as third vice president, Procter and Gamble, Cincinnati; L. B. Parsons, fourth vice president, Lever Brothers, Cambridge, Mass. Re-elected were H. L. Roschen, secretary, of Swift and Company, Chicago, and J. P. Harris, treasurer, of the Industrial Chemical Sales division, West Virginia Pulp and Paper company, Chicago.

PERSONNEL

Hercules Promotes Gloor

Walter E. Gloor, plastics supervisor at the Parlin, N. J., plant of Hercules Powder Company, will head a new products development section of the company's Cellulose Products Department in Wil-

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mington, Del., with Courtland K. White, formerly in charge of chlorinated rubber production at the Parlin plant succeeding Mr. Gloor. The change became effective June 1.

Besides Mr. Gloor, the new products development section will include several chemists who will work with the Cellulose Products Department research group at the Hercules Experiment Station outside Wilmington. They will develop new cellulose compounds, introduce them to industry and investigate their market potentialities. Mr. Gloor will supervise development work done by the section.

Monsanto Transfers

The appointment of Robert E. Holmes as divisional export mananger for Monsanto Chemical Company at Everett, Massachusetts, is announced by L. A. Pratt, general sales manager for Monsanto's Merrimac Division.

Mr. Holmes, who handled Merrimac sales in the Philadelphia area will be succeeded by Roy T. Cowing, salesman for Chicago. Mr. Cowing will be replaced at Chicago by Ralph E. Nelson, formerly divisional export manager at Everett.

Burrell and Neidig Enter Consulting Field

Harry Burrell and C. P. Neidig have announced the formation of Burrell & Neidig, an industrial chemical consulting firm with offices at 115 Broadway, New York City.

Mr. Burrell was formerly director of research of the Heyden Chemical Corporation, Garfield, N. J., laboratories, and Mr. Neidig was in charge of the Market Research and Technical Service for the Heyden Corp.

Burrell & Neidig plan to consult on formaldehyde and its uses, plastics and their raw materials, protective coatings, sales development work on new products, research administration and market surveys for the chemical and allied fields.

Synthetic Nitrogen Names Sales Head

Werner Duehrssen has been appointed sales manager for the Synthetic Nitrogen Products Corporation, New York, to succeed J. E. Culpepper, who has resigned, effective June 1. The company has announced that its branch office in Charlotte, N. C., will be discontinued.

Chemists' Club Awards Honorary Memberships

Three Honorary Memberships in The Chemists' Club, the first such honors to be awarded since 1939, have recently been granted by the Club's membership. Only 33 such awards have been made since the practice was instituted in 1909.

The three men who now have received

this distinction are: William Cullen, Imperial Chemical Industries, Ltd.; Sir Robert Robinson, Waynflete Professor of Chemistry, Oxford University; and Willis R. Whitney, formerly vice-president and director of research of the General Electric Co.

Toch, Noted Paint Chemist, Dies

Maximilian Toch died at New York on May 28 at the age of 81. Dr. Toch, renowned for his achievements in organic chemistry, was president of Toch Bros. Inc. and chairman of the board of Standard Varnish Works.

Reichhold Names Southern Executives

Henry Reichhold, chairman, Reichhold Chemicals, Inc., announces that P. J. Ryan of Detroit, for several years vice president in charge of production, has been made vice president in charge of the Southern Division.

Carl B. Fritsche, who has been in Tuscaloosa since the founding of the first RCI Southern Division plant, has been appointed vice president in charge of product development and will be handling market analyses, raw material surveys and other special projects in connection with the management's expansion program in the south.

Mr. Ryan will be assisted by, C. A. Murray, plant manager; A. J. Snyder, technical service; and R. B. Fellows, sales and service. All three of these men have been affiliated for some time with the main plant and laboratories at Detroit, Michigan.

Personnel Notes

Fred Wechsler, who for the last 5 years held an executive position with James McCreery & Co., has joined Tuteur & Co., Inc.

The retirement of JASPER E. CRANE as a vice president and member of the Executive Committee of E. I. du Pont de Nemours & Company, effective May

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31, and the selection of CRAWFORD H. GREENWALT, assistant general manager of the company's Pigments Department, to succeed him was announced recently.

L. A. MONROE, formerly with OPRD has joined the Market Development division of Ethyl Corp., with New York headquarters.

T. C. DAUPHINE, formerly a research engineer with California Research Chemical, has joined Oronite Chemical Co. as eastern manager of product development.

The War Department has awarded a Certificate of appreciation to GUSTAV EGLOFF of Universal Oil Products Company for his services to the department during the war.

JAN TEPPEMA has joined International Plastic Corporation of Morristown, N. J., as Director of Laboratory Operations. He was formerly chief chemist of the B-B Chemical Company, Cambridge, Mass.

EMORY F. SMITH has been appointed sales manager for Koroseal and other plastics merchandized by the International B. F. Goodrich Company, it is announced by Stanley W. Caywood, president.

The Velsicol Corporation, Chicago, producer and marketer of petroleum chemicals, has recently added DIXON C. VAN WINKLE to its Eastern Sales Staff.

DONALD B. KEYES has recently been elected to the Board of Directors of Heyden Chemical Corporation, and American Plastics Corporation.

JAMES T. SKELLY, JR., has been appointed assistant director of sales of the Cellulose Products Department, Hercules Powder Company. Mr. Skelly is the son of the late James T. Skelly, who was a vice president of Hercules.

JOHN M. STADTER, formerly general purchasing agent for the Glidden Co., has been advanced to the post of assistant general sales manager of the Chemical and Pigment division and C. P. ENGELSMAN has been appointed sales manager of the division's Oakland, Calif. branch.

J. KENNETH CRAVER, of the Monsanto Chemical Company's research staff at St. Louis, Missouri, has been appointed coordinator of plasticizers and resins for the Organic Chemicals Division of his company.

RALPH MORGAN has joined the sales staff of Givaudan-Delawanna, Inc., and will be in charge of the Philadelphia office. He succeeds Ira J. Bennett, who has retired after almost twenty years with Givaudan.

EDWIN L. HOBSON has joined Monsanto Chemical's sales staff. Recently a lieut.-col. in the U. S. Army, Mr. Hobson was formerly with Bakelite Corp.

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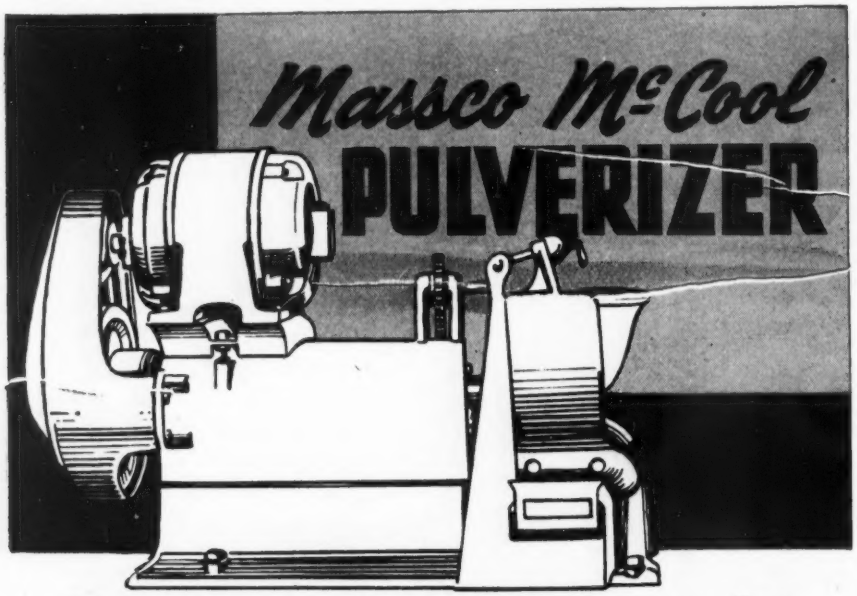

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NEWS *of* SUPPLIERS

Charles E. Misch, metropolitan district manager of the Read Machinery Company of York, Pa. for the past eleven years, and in charge of the company's Ordnance Division during the war years, resigned June 10th to form his own firm. The **Charles E. Misch Co.** will offer a consulting engineering service and will act as manufacturers' agents for a list of specialized equipment for the chemical and food processing industries. Operations will cover the Eastern states, from Maine to Virginia, with headquarters in New York at 11½ East 87th Street.

A new firm for the sale of special equipment in process engineering has been organized by **W. H. Davidson** and **H. E. Serner** with offices at Commercial Trust Building, Philadelphia, Pa. and 342 Madison Avenue, New York, N. Y. The firm will specialize in the fields of solvent extraction, agitation, solvent recovery, mixing, distillation, heat exchange processing, and furnace design.

The **H. K. Porter Company, Inc.**, Pittsburgh, Pa. announces the opening of a new district office in the Paul Brown Building in St. Louis, Missouri. This will be the twelfth district office handling Porter-Devine-Quimby products.

Genn & Logan, 3959 N. Lincoln Avenue, Chicago 13, Ill., has been formed to represent The C. M. Kemp Mfg. Co. of Baltimore, Md.
The principals of the new firm, Earl Genn and Frederick D. Logan, have both been active in the sales and development end of industrial gas utilization for some years, having formerly been vice president and chief engineer, respectively, of Gas Appliance Service, Inc., Chicago.

The name of **Coaltoter Conveyor Company** (Not Inc), 310 S. Michigan Ave., Chicago, has been changed to Material Movement Industries effective May 15.
The company manufactures electric and gasoline engine-driven portable conveyors for handling bulk and packaged materials.

Sale of the Thermoid Rubber Plant at South Clarence Street, Los Angeles, Calif. by Thermoid of California, Inc. to **Consolidated Products Co., Inc.**, of New York, dealers in chemical and rubber machinery, is announced by Martin I. Cowen. This is the former Grizzly Manufacturing Company, which under Thermoid ownership, has been producing rubber belting, brake linings, hose and molded products on the Pacific Coast. The plant may be reopened, or dismantled.

Chemical Smokes

(*Continued from page 981*)

of cadmium, zinc and calcium. The motion picture industry finds use for such smokes in the production of glamorous displays and special color effects recorded in technicolor.

Colored smokes have also been used to increase the visibility of life boats and rafts to attract rescue aircraft. In such cases a small grenade type smoke generator is used which is activated when water comes in contact with its metallic potassium igniter. The heat generated vaporizes a volatile dyestuff which in a three to five minute period produces a colored smoke extending over several thousand square feet, visible to air craft within a radius of many miles.

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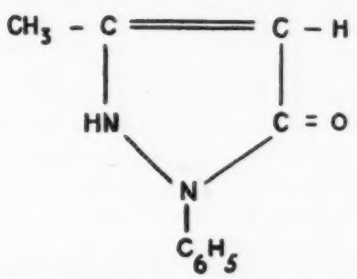

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CHEMICAL SPECIALTIES NEWS

Oil Companies Push Specialties

Oil companies have long recognized the potential value of their gasoline stations as low-overhead facilities for the distribution of packaged specialties. Originally, through these outlets they retailed a few items, such as automotive specialties, produced by independent manufacturers. Then, came the addition of other items to their retail list, and the appearance of more and more "private label" packages. Today, the trend in this direction is more pronounced; a trend which has been accentuated by the wide publicity accorded DDT.

Keen competition appears on the horizon. For, petroleum products are suitable solvents, as, of course, are alcohols, ketones, and chlorinated hydrocarbons. The major petroleum companies are in a position to prepare DDT solutions, and package and distribute on a mass production basis. Several have clearly crystallized plans to further exploit the situation.

Stearns Markets Germicide to Brewers

Roccal, a quaternary ammonium germicide introduced by the Winthrop Chemical Company, Inc., several years ago, is now being marketed to the brewery trade by the Digestive Ferments Department of the Frederick Stearns & Co. Division, Sterling Drug, Inc. Winthrop continues to distribute the product in other than the brewery field.

The germicide is packed in pints, quarts, gallons, and 13 gallon carboys, for distribution to brewers.

Develop Non-Corrosive Cutting Oil Bases

Three new cutting oil bases for use in the metal-working trades, including one in which sulphur and chlorine are combined in non-corrosive form, have been developed in the research laboratories of the National Oil Products Company, Harrison, N. J., according to company officials.

Pennsalt Markets Rust Preventative

Pennsylvania Salt Manufacturing Company has announced a new rust preventing agent for use in water on ferrous metals before they are painted, enameled or between machine operations.

The product, packaged in 25, 100 and 300 pound fibre-pak drums, is Pennsalt RI-50, an inorganic salt mixture used in water solution to give temporary rust protection on ferrous metal parts during processing.

It is used as a water solution within a concentration of two to four per cent and is designed for protecting metals for short periods such as after cleaning and prior to painting or enameling. It requires no rinsing before painting.

Set Aerosol Bomb Ceiling Prices

A retail ceiling price of $2.65 has been established for new one-pound insecticide liquid aerosol bombs declared surplus by the government and now available to civilians, the Office of Price Administration has announced. Packed 24 to a case, the bombs contain pyrethrum, DDT, cyclohexanone and lubricating oil. On all sales to wholesalers, the ceiling price is $1.15 each, and on sales to retailers the ceiling is $1.70 each.

Novel Household Sprayer

A small, all-metal hydraulic type household sprayer that develops an average 300-pound nozzle pressure with a single stroke of its 2½-inch piston is now being manufactured by the Cornelius Co. of Minneapolis.

Complete vaporization of liquid is accomplished by a new type nozzle, which has a tiny orifice .006" in diameter placed in front of a slotted diffuser plate. This plate, with its minute openings, helps to break the liquid into a fine mist.

A feature of the sprayer is an airlock behind the cylinder which allows the sprayer to be used in any position without danger of leaking. As liquid is drawn up from the container to fill the cylinder, air current rushes through airlock to replace it. Movement of the air wipes the piston clean and carries excess fluids back to the container.

Combination Insecticide Offered

A new insecticide, placed on the market recently by du Pont under the name of du Pont Garden Dust, contains a combination of DDT, rotenone, and ferric and zinc dimethyl dithiocarbamates.

According to the maker, most diseases may be controlled by application of the dust at 7 to 14 day intervals throughout the growing season. It is not recommended, however, for dusting squash, cucumbers, or melons, in view of the possible harmful effect of the DDT content.

Nielco Announces New Acid Cleaner

Nielco Laboratories, Detroit, Mich. announces the development of Nielco 1931-M acid cleaner, which is suggested as a less hazardous material than muriatic for use in cleaning stone, glass, asbetsos shingles, etc.

The compound, packed in barrels as a free-flowing powder, soluble in hot and cold water, can be applied by means of a brush or sponge, or by means of a steam cleaning unit. Company recommendations call for 4 to 8 ounce per gallon solutions, for most purposes.

New Synthetic Detergents Unit

World Chemical Corp., New York, has opened a new plant at Queens, N. Y. for the manufacture of synthetic organic detergents for the textile, leather, soap, and industrial cleaner fields.

Named 3M Vice-President

Louis F. Weyand, general manager of the adhesives and coating division of Minnesota Mining & Manufacturing Co. has been appointed a vice-president of the firm. He has been with the company since 1915, and was formerly a divisional sales manager.

Ethyl Specialties Names Sales Head

Harry S. Bean has been appointed sales promotion manager for Ethyl Specialties Corporation, formed to market packaged products of Ethyl Corporation. He formerly was associated with Lever Brothers Company, Cambridge, Mass.

German Wood Preservative Substitute

Toxic salts were substituted for coal tar creosote for preserving railroad crossties and other wood products in Germany during the war, according to two reports released by the Office of the Publication Board, Department of Commerce. Use of creosote for this purpose was prohibited by the German Government in 1938.

The most commonly used preservative, "Flunax," consisted of sodium fluoride

(84 per cent), xylenol (8 per cent), and caustic soda (8 per cent). It was used mainly in treating railroad ties.

Fire retardants and other special preservatives were produced only in limited quantities.

Government Notes Aerosol Regulations

The U. S. Dept. of Agriculture reports that to date it has approved no formula for aerosol insecticides—for general sale to the public—containing more than 3 per cent DDT. The Bureau's contention is that larger amounts of DDT may be toxic to humans and not any more effective against flying insects.

Likewise, it is maintained that such aerosol formulations should contain pyrethrum for maximum effectiveness, in addition to small percentages of DDT, and should be used only for the control of flies, mosquitoes, and such flying insects, indoors. It is suggested that aerosol products cannot be used economically in combatting cockroaches, ants, bedbugs etc., and other insecticide compounds are preferable for such purposes.

Standard Oil Markets Two New Specialties

Development of a new product called Stano-Purge for cleaning crankcases and lubrication systems of engines and another specialty named Stano-Vim for purging fuel burning systems of gasoline engines is announced by Standard Oil Company of Indiana. Neither product is generally available at service stations, yet —but both will be soon.

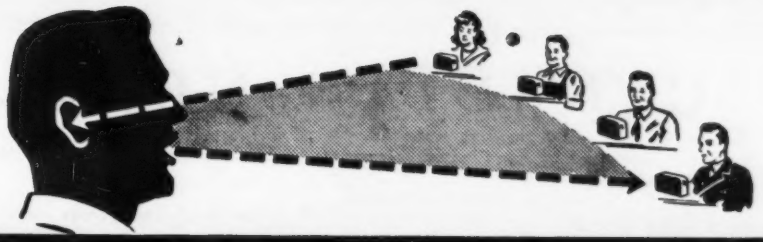
Stano-Purge is designed to remove loose crankcase sludge and clean oil screens and passages. Stano-Vim's function is to remove varnish, gum, and carbon deposits from valve stems, manifold, and intake valve parts, remove combustion chamber deposits, and clean fouled spark plugs.

Both compounds have high solvency for resins and gums formed by deterioration of motor oil, and low volatility with high flash point—which will minimize fire hazards. Their aromatic solvents content is more than 90 per cent and they have the pronounced odor characteristic of naphthalenes.

Navy Develops Rubber Cement

A plastic cement for waterproofing seams in parkas and jackets has been developed by the Navy, which is claimed to have a high resistance to both moisture and low temperatures. Essentially, it is composed of a mixture of butadiene-acrylonitrile and vinyl chloride.

Three coats of the compound applied to double needle seams withstand water pressure of 148 pounds per square inch at room temperature.



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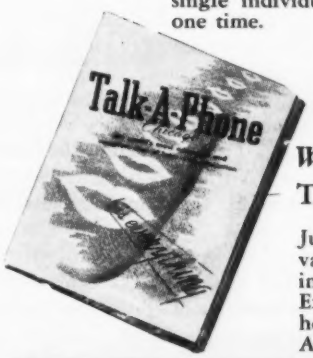

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CANADIAN NEWS

Dow Plans First Ethylene Glycol Unit

Dow Chemical Co., currently completing a $1 million polystyrene plant at Sarnia, Ont., has confirmed long-rampant reports that it will soon initiate construction of Canada's first unit for the manufacture of ethylene glycol. The $3 million glycol facilities will also be located at Sarnia, where ethylene is available in quantity, and is expected to come into full scale operation next spring. Consideration is also being accorded to the creation of an auxiliary $4 million chlorine project to provide the requisite quantities of this processing element.

At present, the Dominion relies entirely on the U. S. for its 6 million lbs. per annum needs of glycol, for, although several petroleum and chemical concerns have long considered its manufacture, plans failed to crystallize. Actually, ethylene glycol has been one of the most discussed chemicals in Canada during recent years, and institution of domestic manufacture has more than usual significance.

In the first place, glycol consumption has been expanding steadily, and the wider attention being paid to alkyd resin output may well further enhance this trend. Secondly, glycol has been gaining favor as an automotive anti-freeze—a matter of some moment in view of Canada's winter climate.

Thereby, repercussions in the ethyl alcohol market are probable, particularly in view of the fact that the latter industry is over-built, and almost half its output has been channelled into anti-freeze compositions during recent years.

Too, dollar a gallon prices have imposed limitations on the use of ethanol as a chemical raw material. Such circumstances may well result, eventually, in the evolution of the usual predictable market pattern.

Government Sells Low Cost Ammonia Unit

Consolidated Mining and Smelting Co., major producer of fertilizers for domestic and export sale, has purchased from the government two Crown-financed units, which it has operated during the war, for $7.5 million. The transaction includes both Alberta Nitrogen Co. at Calgary, and the Trail, B. C., ammonium nitrate facilities.

The Alberta Nitrogen Co. project, in particular, has long been regarded as one of the most desirable of all Canada's war-created chemical plants, in that it is claimed to be the world's lowest cost producer of ammonium nitrate. Designed jointly by I. C. I. and Smelters, it originally was created as a 100 ton per day unit, but later capacity was upped to 230 tons. It utilizes natural gas as a raw material.

The disposition of these properties focuses new attention on the $17 million, government-financed, Welland Chemical Works, which has operated as a sulfuric, ammonia, ammonium nitrate, and explosives producer. Managed by Cyanamid, on a fee basis, no official word has been released as to plans for its peacetime utilization, other than Reconstruction Minister Howe's statement (CI. Feb. '44 —p. 251), that "it would be disposed of to private interests and continue to operate."

Alcan Goes After World Markets

Aluminum Company of Canada, Limited, in its quest for wider post-war markets has lowered the price of raw aluminum in ingot form of 99.5% guaranteed purity to 13¼¢ a pound delivered in carload lots. Heretofore, aluminum ingots have been selling at 15¢ a pound, f.o.b. Arvida, Quebec, and with an average delivery cost of 1¢ per pound absorbed by the buyer, the new selling price represents a 17% reduction in the cost of this raw material to the consumer.

Under the pressure of war, Canadian aluminum production expanded from 60,000 tons per annum in 1938 to an output potential estimated at 500,000 tons annually. As Canadian consumption is only 40 million pounds or about thirteen days' production, Canada will likely compete with the United States for export markets. A recent agreement to sell the United Kingdom 430 million pounds of aluminum at a new low of 12¢ a pound points up this aspect of Alcan's sales program.

Varcum Chemical Enters Canadian Field

Varcum Chemical Corp., Niagara Falls, N. Y., has formed a Canadian subsidiary to be known as Varcum Chemical Corp. (Canada), Ltd.

Construction of a new plant, at Lindsay, Ont.—some 90 miles from Toronto—will begin in July. The unit will be devoted to the output of phenol-formaldehyde resins and molding compositions.

New Plant for Abbott Laboratories

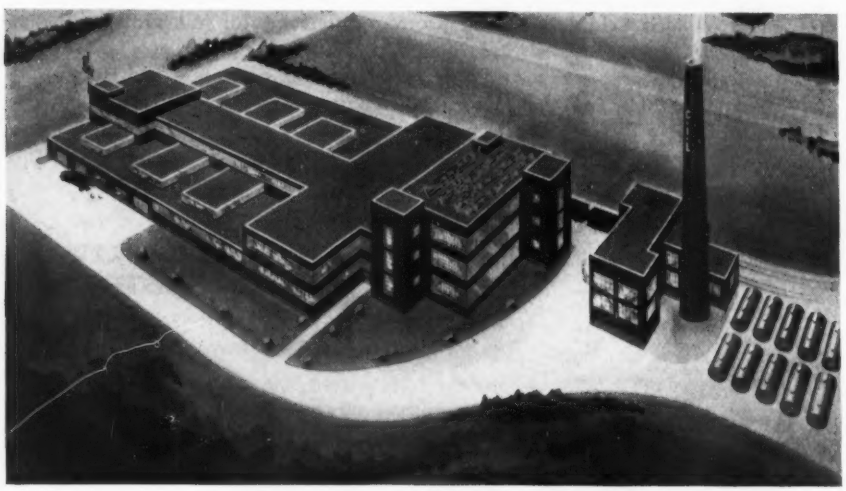
Abbott Laboratories, subsidiary of the Chicago organization of the same name, is constructing a new $500,000 unit at Montreal to house expanded operations for the manufacture of its line of pharmaceutical products.

Founded in Canada in 1931, Abbott has had to extend its facilities on three occasions as markets broadened and permitted domestic manufacture of additional, formerly imported, lines.

Monsanto Acquires Subsidiary

William M. Rand, president of Monsanto Chemical Company, St. Louis, Mo., announced recently that Monsanto (Canada), Limited, has acquired the capital stock of Laucks, Limited, adhesive manufacturers, with headquarters at Granville Island, Vancouver, and will operate the company as a wholly-owned subsidiary. Laucks, Limited, will act as a Western Canada sales outlet for products of Monsanto (Canada), Limited,, and the latter will sell Laucks products in Eastern Canada.

New C. I. L. Plant for Toronto



Architect's drawing of the $1,400,000 unit being built by Canadian Industries Ltd. (I. C. I-Du Pont) at Toronto. It will be utilized both for the manufacture of industrial and retail finishes, and for the production of alkyd resins.

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40 lb. tin	lb.	1.75
8 lb. tin	lb.	2.00
1 lb. bottle	bot.	3.00

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Brand Name	Indopol L-10	Indopol H-100	Indopol H-300
Mean molecular weight	330	780	940
Viscosity S.U. seconds at 100°F.	114	—	—
at 210°F.	40.6	942	3330
Specific gravity 60°/60°F.	.831	.881	.894
Refractive index (20/d)	1.4655	1.4918	1.4959
Color, N.P.A.	2	2	3
Pour point (ASTM)°F.	−65	+20	+35
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MARKET OUTLOOK

Serious Aftermath of Coal Strike Foreseen

Worldwide Copper Shortage Imminent

Swiss Dye Competition Looms

Insecticides Tighten

Market Review

●

Coal Strike Curtails Chemical Output

Although the coal strike served to virtually paralyze all industry, it dealt a near-crippling blow to chemical production. For, coal serves not only as a source of power, and processing steam, in the chemical industry, but also as a vital raw material. A fact well recognized during the war, when coal was allocated to chemical plants to ensure continued operation.

The harm done is irreparable; tons of chemical output has been lost; and it will be many months before many basic chemicals will return to the market in near-adequate quantities. Actually, in the trade, the more gloomy—but perhaps the more realistic executives—view the present situation as but the prelude to even worse conditions which will arise as individual shortages pyramid.

Most major chemical plants had no more than a 30 day inventory of coal when the strike began, and consequently, many important producers had to curtail operations, or close down functioning units. Although the entire industry felt the effects of the coal strike to some degree, naturally, the coal tar chemical division suffered most acutely.

Ammonium sulfate—already down 124,000 tons as a result of the steel strike—dipped sharply as steel producers struggled to maintain a 49 per cent operating rate. Production of naphthalene, phthalic anhydride, benzol, toluol, xylol, creosote oil, phenol, and the myriad coal tar-derived products sagged. Methyl, ethyl, butyl alcohol, and their esters; formaldehyde, caustic, ammonia, and urea, were likewise depressed, to mention but a few.

The loss of output in these commodities is serious enough in itself, but it will probably be a matter of several weeks to two months before the full impact of the coal strike dislocation is felt. Then, resins manufacturers may well fall well below schedule, as raw material shortages crystallize, with its consequent repercussions in paints, textile, drug, and dependent industries. All industry will be affected; all will feel the pinch.

For it is axiomatic that the chemical industry is the foundation of all manufactures.

The immediate results of the coal strike are apparent; the aftermath may well depress the business curve for months to come.

Copper Moves Into Stringent Position

A shortage of copper is developing throughout the world, at a time when it was anticipated that an actual surplus of the red metal would exist. Great Britain and other European countries have been actively out-bidding the U. S. for available foreign-produced supplies in the light of the fact that their requirements far exceed earlier estimates. With the U. S. more dependent on imports than ever before,—occasioned by strikes at major producing centers— the situation is particularly grievous.

Although American consumers received some 76,000 tons of metal during April—17,000 tons more than March shipments—total U. S. production amounted to only 29,379 tons. Releases from the 399,000 ton Government stockpile made up the difference. But this arrangement can by no means accommodate demand for too long, particularly in that receipts of copper from foreign sources have fallen sharply. Of the 20,000 tons per month contracted for abroad by Metals Reserve Co. early this year, less than one-quarter has been received. Official explanation; lack of shipping. Industry's contention; too low a ceiling price.

The flow of imports has ebbed seriously. Demand has burgeoned to 1,250,000 tons per annum. Even without the strikes, only heavy imports and releases from government stockpiles could have met 1946 demand. Now, a severe shortage is in prospect.

With European consumers bidding 14 cents a pound for copper, and U. S. ceilings pegged at 12 cents, tonnage imports cannot be anticipated. Too, domestic producers claim that operations cannot be profitably maintained under the existing 12 cent price. They hope for a 15 cent figure, and the odds favor their realization of at least 14-15 cents. Any increased costs in production as a result of wage negotiations now being conducted will be compensated by a direct price increase ratification, rather than by any

Market Review

Heavy Chemicals—As a result of the coal strike, output of alkalies last month was pared to about one-half former levels, to still further aggravate what has long been a drastic condition. Even though premium prices were offered for spot quantities of caustic, no offerings appeared on the market. Apart from this item, soda ash, and all the phosphates tightened, with tetrapyrophosphate virtually unobtainable.

Calcium chloride deliveries fell two months behind, and price increases were effected in butyl alcohol and butyl acetate. The former rose 1.3 cents from its former tank price of .221 cents. Sulfuric acid eased slightly, as demand from copper salt producers fell off, and as superphosphate concerns experienced difficulty in obtaining rock.

Naphthalene tightened markedly, as did all coal-tar derivatives, but saltpeter softened in keeping with the diminished needs of meatpackers. Sodium stannate also dipped from its usual 33-36 cent level to 25 cents.

Fine Chemicals—Major trend in this division was the strengthening of the market for acetyalsalicylic acid, and nearly all coal-tar derivatives. Major silver salts, and most strychnine compounds occupied a similar tight position, and unusual activity was noted in sulfa drugs.

Glycerine, theobromine, camphor, menthol, and mercury, all remained firm, although tartaric acid and cream of tartar tended to soften in view of prospective lower replacement costs. Good quantities of citric acid moved steadily direct to consumers, while the sharp drop in bismuth output adversely affected deliveries of the subnitrate and carbonate. Little possibility of an easing in the supply condition of the last mentioned is foreseen.

Raw Materials—Carnauba moved into a higher price bracket, with dealers suggesting that even higher levels might obtain this fall. Gum tragacanth, likewise displayed a firmer tone, in the light of reduced domestic inventories and indeterminate replacement stocks. Cod liver oil was seasonably quiet, and easing with the arrival of Norwegian consignments. Both peppermint and pine-needle oil firmed, with price increases mooted. In the case of the former, it is believed that if the British loan is approved, additional demands from Great Britain—which normally consumes half the U. S. mint crop—would still further strengthen peppermint prices.

subsidy arrangement. Automatically, copper salts will too move into a higher bracket.

U. S.—Swiss Chemical Trade Revived

U. S. chemical trade with Switzerland, which was sharply curtailed during the war, is now inching back to its prewar level. Exports have risen to $1.3 million during the first nine months of 1945—from $313,000 in the preceding year—to approximate 1941's record $1.5 million.

Imports during the same nine month period totalled $1.9 million, whereas for the past two years annual sales have been limited to $1.7 million. Peak shipments valued at $6.1 million were recorded in 1939.

The Swiss chemical industry places primary emphasis on specialty dyes and pharmaceuticals for export trade, and now is intensively cultivating both North and South American markets, largely in competition with U. S. producers. Such a condition has arisen, in the main due to the diminished purchasing power of Germany and neighboring countries.

Strikes Disrupt Insecticide Output

The agricultural insecticide and fungicide supply situation, long serious, is now critical. The coal strike, superimposed upon all the other disruptions which have adversely affected insectide output, has created a condition rather barren of promise.

The complications are numerous. The wave of secondary strikes slowing down output of arsenic, lead, copper, and other raw materials, caused insecticide cutbacks. Swedish arsenic, originally reported as plentiful by government agencies, is not obtainable in time for this season's use. Spray lime—short in some areas,and used by both manufacturer and grower—has tightened with the paring of coal stocks.

In summary, the prospects for individual items are as follows: Calcium arsenate, reasonably adequate for early crops, will probably be very tight later; copper sulfate and monohydrate are approaching the critical stage, whereas stocks of carbonate are in fair shape.

DDT formulations, dinitro compounds, formaldehyde, paradichlorobenzene, and zinc compounds have all tightened markedly during the past month, and the outlook is far from roseate. Lead arsenate, nicotine, and rotenone, are in short supply, but some easing in rotenone may be effected later this month if shipments en route from Iquitos arrive.

On the other side of the ledger, ethylene dichloride, carbon bisulfide, carbon tetrachloride, chloropicrin, methyl bromide and sulfur are available, and although borax is difficult to obtain a tonnage sufficient to meet essential needs is in prospect.

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Potash Deliveries At High Level

The record-breaking schedule of deliveries established by the five major American potash-producing companies during the war has continued through the first quarter of 1946 when 464,598 tons of potash salts containing 259,639 tons of K_2O were delivered. This represented an increase of 7% in salts and 12% in K_2O over the corresponding period in 1945.

Deliveries for agricultural purposes in the United States, Canada, Cuba, Puerto Rico, and Hawaii consisted of 430,379 tons of potash salts equivalent to 238,378 tons of K_2O, compared to 206,745 tons K_2O in the first three months of 1945. Muriate of potash predominated with 214,402 tons K_2O, whereas 16,846 tons were delivered as sulphate of potash and sulphate of potash magnesia, and 7,130 tons as manure salts. Deliveries for chemical purposes totaled 26,078 tons of salts equivalent to 16,282 tons K_2O, a reduction of 33⅓% from the corresponding period a year earlier. Exports to other countries amounted to 8,142 tons of potash salts containing 4,979 tons K_2O.

Naval Stores Output Up for Crop Year

A substantial decline in the use of rosin by two major consuming industries—namely, soap and paint manufacturers—is attributed mainly to shortages of other raw materials which these industries experienced last year.

The limited availability of drying oils for paints, and tallow for soap, adversely affected rosin consumption, so that they did not utilize customary quotas. Too, soap processors tended to lean rather heavily on the higher-profit toilet soaps, and less attention was devoted to cheap, rosin-containing, laundry detergents.

Although ester gums and synthetic resins absorbed 250,385 drums in the 1945-46 naval stores year, against 249,252 drums in the preceding year, it is probable that consumption may decline somewhat in the immediate future unless glycerine eases. Use of rosin by paper manufacturers declined from 379,383 drums in 1944-45 to 274,022 drums, partly as an outcome of the wider utilization of substitute materials.

Total industrial rosin consumption in the crop year ending March 31, was 1,219,234 drums of 520 lbs. each. Production totaled 1,452,036 drums. In the preceding year consumption and production amounted to 1,541,366 and 1,317,912 drums, respectively.

The larger production gain was recorded in wood rosin, with output up from 625,000 drums to 757,560 drums. Gum production rose from 692,212 drums to 694,476 drums.

Total turpentine production rose from 471,243 barrels of 50 gallons each in 1944-45 to 488,131 barrels in 1945-46. Production of wood turpentine rose from 226,049 barrels to 243,879 barrels. Gum turpentine output showed a slight drop from 245,194 barrels to 244,252 barrels. Total industrial consumption in the United States fell from 190,196 barrels to 164,090 barrels. Use in chemicals and pharmaceuticals dropped from 129,957 barrels to 107,078 barrels.

Exports of turpentine rose from 65,263 barrels in 1944-45 to 92,445 barrels in 1945-46.

Production of pine oil rose from 103,467 barrels in 1944-45 to 110,066 barrels in 1945-46. Year-end stocks increased about 2,000 barrels. The output of dipentene rose from 18,636 barrels to 19,395 barrels. Stocks March 31 this year were 3,164 compared with 3,189 barrels a year ago.

Strontium Sulfate Output Down

The celestite (strontium sulfate) industry waned further in 1945, four producers reporting shipments of 2,784 short tons valued at $27,840, compared with 3,005 tons valued at $48,165 in 1944, according to the Bureau of Mines.

During the war domestic celestite was valuable as a substitute for barite in weighting rotary oil well drilling muds and to some extent in the manufacture of strontium chemicals. As war demands eased, barite became more plentiful in the drilling areas, and also requirements for strontium chemicals in tracer bullets and flares were reduced drastically.

Celestite producers have been forced to seek other outlets, generally local, such as use in purifying caustic soda solutions and in making small quantities of strontium chemicals for peace-time application.

Fertilizer Exports Rise; Imports Decline

Exports of most classes of fertilizer materials in January and in July-January were substantially larger than in the corresponding periods of last year, The National Fertilizer Association reports.

Total shipments in January were double those in January 1945. At nearly 97,000 tons with a stated valuation of $1,858,000, they exceeded January of last year by 116 per cent in volume and 92 per cent in value. Of the shipments during the month, 4,300 tons were under authority of the Lend-Lease Act and 10,200 tons were for UNRRA account.

In the first 7 months of the current fertilizer year, July through January, exports amounted to 785,000 tons, or 66 per cent more than in the like period of 1944-45.

PLASTIC WATER PAINTS, COLD-WATER PAINTS, AND CALCIMINES

The statistics presented in the following table are based on data reported by 38 identical manufacturers who accounted for approximately 87 per cent of the total value of plastic texture paints, cold-water paints and calcimines in the United States, as reported in the Biennial Census of Manufacturers, 1939. For comparable figures beginning January 1945, and an explanation of certain changes which affect previously published data, see "Facts for Industry," Series M19K-85, released November 12, 1945.

SALES FOR JANUARY AND FEBRUARY 1946

Product	*February*	*January*[1]
Plastic-Texture Water Paints, Total:[2]		
Pounds	1,278,361	1,099,783
Value	$87,008	$75,020
Cold Water Paints, Total Value	$502,624	$467,914
Interior, total value	$319,587	$331,199
Casein and other protein bound:		
Paste and semipaste form—		
Gallons	187,680	210,025
Value	$239,892	$269,078
Dry Powder form—		
Pounds	892,774	782,903
Value	$70,902	$55,920
Glue bound—		
Pounds	274,851	177,583
Value	$8,793	$6,201
Exterior, total value	$183,037	$136,715
Casein and other protein bound:		
Pounds	337,221	274,046
Value	$20,559	$17,621
Lime and/or cement bound—		
Pounds	2,059,944	1,596,416
Value	$162,478	$119,094
Calcimines, Total:		
Pounds	2,053,074	2,466,997
Value	$96,382	$111,035
Hot water—		
Pounds	965,928	1,110,860
Value	$45,123	$49,287
Cold-water—		
Pounds	1,087,146	1,356,137
Value	$51,259	$61,748

[1] Revised.
[2] Includes Paste and Dry Powder Plastic-Texture Water Paints which cannot be shown separately without disclosing operations of individual companies.

Source: Bureau of the Census

Lend-Lease shipments amounted to 121,000 tons and UNRRA shipments to 72,000 tons.

January fertilizer imports, totaling 137,000 tons valued at $3,798,000, under-ran January 1945 by 25 per cent in tonnage and 12 per cent in value. Smaller imports of sodium nitrate accounted for the drop for there was a net increase of 3,000 tons in aggregate imports of all other materials.

The decline in July-January tonnage was due entirely to the falling off in sodium nitrate. There were increases in imports of other nitrogen-bearing materials, particularly ammonium sulphate and cyanamide. Bone phosphates were imported in larger volume this year, but imports of other phosphates dropped sharply. Import tonnage in the seven months was 18 per cent below last year, compared with the 66 per cent rise in export tonnage.

Rayon Output at New Peak

Domestic rayon production for the first three months of 1946 reached the record level of 212.8 million pounds, a gain of 4% over fourth quarter output in 1945 and 10% greater than in the first quarter last year. Each division of the rayon yarn and staple fibre producing industry attained new high levels.

First quarter rayon filament yarn production aggregated 169.1 million pounds and rayon staple fibre output totaled 43.7 million pounds.

Shipments of rayon yarn to domestic trades during the first quarter totaled 164.3 million pounds. Total yarn shipments to the hosiery industry aggregated 6 million pounds.

Rayon yarn exports of 3.3 million pounds in the first quarter were 27% greater than the fourth quarter of 1945, but down 42% from the war-time rate of the first period in 1945.

Total domestic shipments of rayon in April of 72.3 million pounds were 4% below March but 16% above April, 1945, and April deliveries of rayon yarn were 1% below the March level while staple fibre shipments decreased 12%.

Zinc Inventories Improve

Inventories of slab zinc at consumers' plants and stocks of zinc dust and slab zinc at producers' plants continued to advance in January 1946, according to the Bureau of Mines. A 25-per cent gain in zinc oxide shipments and a 5-per cent decline in slab zinc shipments brought about a complete reversal in trends shown in December 1945.

Producers' stocks of zinc oxide, after attaining the high level of 31,096 tons in December 1945, decreased 6 per cent in January 1946. Zinc dust inventories at producers' plants increased 54 tons (3 per cent) in January to establish a new high record of 1,856 tons.

Production of zinc oxide rose slightly

PRODUCTION OF SYNTHETIC ORGANIC CHEMICALS

The data in the following table supplement the figures released in the Facts for Industry Series 6-2-1 to 6-2-26; production includes all material produced whether consumed in producing plants, transferred to other plants of the producing companies, or sold.

Chemical[1]	*Unit of quantity*	*Production*	
		Total 1945	*February 1946*
Acetanilid, tech. and U.S.P.	Pound	6,951,294	488,658
Acetic acid:			
Synthetic	Pound	[R]263,294,756	21,344,997
Recovered	Pound	[R]1,006,643,721	85,976,699
Natural[2]	Pound	31,645,086	1,798,494
Acetic anhydride[3]	Pound	526,264,258	38,330,052
Acetone	Pound	[R]351,422,643	26,833,544
Acetylsalicylic acid	Pound	10,860,346	933,846
Aniline	Pound	88,493,006	6,411,349
Barbituric acid derivatives:[4]			
5-Ethyl-5-phenylbarbituric acid and salts (Phenobarbital)	Pound	276,763	26,119
5-Ethyl-5-(1-methlbutyl)-barbituric acid and salts (Pentobarbital)	Pound	53,952	.....
Benzene: (Benzol)			
Motor grade:			
Tar distillers[5]	Gallon	3,978,333	953,062
Coke-oven operators[6]	Gallon	28,173,199	1,470,881
All other grades:			
Tar distillers[5]	Gallon	31,956,745	1,966,576
Coke-oven operators[6]	Gallon	127,056,339	4,342,660
Butyl alcohol, primary, normal	Pound	129,275,394	7,709,980
Carbon disulfide	Pound	329,844,695	23,278,743
Carbon tetrachloride	Pound	190,053,616	13,368,298
Chlorobenzene, mono	Pound	234,763,921	19,882,088
Creosote oil:			
Tar distillers[5]	Gallon	127,277,483	7,643,982
Coke-oven operators[6]	Gallon	35,342,391	798,641
Cresols:[7]			
Meta-para	Pound	7,833,171	299,492
Ortho-meta-para	Pound	9,708,509	757,243
Cresylic acid, refined[7 8]	Pound	29,224,088	1,516,830
Dibutyl phthalate	Pound	41,838,451	1,452,979
Dichlorodiphenyltrichloroethane (DDT)	Pound	32,998,587	3,221,865
Dyes (commercial concentrations):			
C.I. 202 Chrome blue black R	Pound	n.a.	.....
C.I. 581 Direct black EW	Pound	n.a.	959,181
C.I. 1114 Anthraquinone vat blue BCS 20%	Pound	n.a.	170,854
F.P. 302 Naphthol AS	Pound	n.a.	40,170
Ethyl acetate (85 per cent)	Pound	103,654,106	6,411,541
Ethyl ethers, tech. and U.S.P.	Pound	75,580,610	2,571,081
Formaldehyde (37 per cent by weight)	Pound	477,822,274	38,253,695
Lakes: Peacock blue	Pound	n.a.	173,504
Methanol:			
Natural[9]	Pound	18,686,726	1,228,466
Synthetic	Pound	491,459,699	41,557,771
Naphthalene:			
Tar distillers:[5]			
Crude, solidifying at—			
Less than 79° C.	Pound	205,923,008	10,074,249
Refined, solidifying at—			
79° C. and over	Pound	77,229,365	8,124,961
Coke-oven operators:[6]			
Crude, solidifying at—			
Less than 74° C.	Pound	34,407,119	
74° C. to less than 79° C.	Pound	53,166,345	2,221,779
Penicillin[4]	Million Oxford units	n.a.	1,702,983
Phenol (synthetic and natural) tech. and U.S.P.[7]	Pounds	204,815,380	13,700,308
Phthalic anhydride	Pound	123,301,944	6,682,466
Styrene (Government owned plants only)	Pound	375,118,886	25,867,056
Sulfa drugs:[4]			
Acetylsulfathiazole	Pound	.....	.....
Sulfanilamide	Pound	.....	.....
Sulfathiazole	Pound	2,090,808	143,954
All other	Pound	3,821,299	260,035
Tetramethylthiuram sulfides	Pound	n.a.	.....
Toluene:			
Coke-oven operators[6]	Gallon	27,588,053	915,245
All other[5 10]	Gallon	122,453,532	837,926
Vitamins:[4]			
Ascorbic acid and salts:			
Quantity	Pound	1,306,813	.....
Value		n.a.	.....
Ergosterol, irradiated (Vitamin D_2):			
Quantity	Million U.S.P. units	25,155,005	1,991,465
Value		n.a.	$106,580
Niacin and niacinamide:			
Quantity	Pound	955,828	69,292
Value		n.a.	$233,245
Riboflavin for human consumption:			
Quantity	Pound	.....	.....
Value		n.a.	.....
All other vitamins:[11]			
Quantity	Pound	n.a.	
Value		n.a.	$3,197,987

[1] Reported on the basis of 100 per cent content of the specified material unless otherwise indicated.

[2] Natural acetic acid (produced by direct process from wood) and acetic acid distilled from calcium acetate as reported to the U. S. Bureau of the Census.

[3] Produced from ketene, acetylene, ethylene, and from acetic acid by the vapor phase process.

[4] Statistics are given in terms of bulk medicinals only.

[5] Produced by tar distillers from purchased coal tar only or from oil-gas or water-gas tar produced or purchased by tar distillers.

[6] Product of byproduct coke-oven operators only. These statistics are collected and compiled by the Coal Economics Division, U. S. Bureau of Mines.

[7] Statistics represent total production, from all sources including both data reported by coke-oven operators to the Coal Economic Division, Bureau of Mines and that reported by distillers of purchased coal tar to the U. S. Tariff Commission.

[8] Includes refined cresylic acid derived from petroleum.

[9] Reported to the U. S. Bureau of the Census.

[10] Includes toluene produced from petroleum by any process; does not include toluene produced under Ordnance control in petroleum refineries, but includes toluene produced from petroleum in plants not under such control.

[11] Includes thiamin chloride, panthothenic acid and salts, riboflavin for animal use, irradiated animal sterols, menadiones, pyridoxine and other vitamins for which statistics are not shown.

Source: Bureau of the Census

during the month but was still 7 per cent below the monthly average of 1945. Output of zinc dust was 3 per cent below the December 1945 production figure.

Despite the unsettled conditions in the steel industry the consumption of slab zinc remained virtually unchanged in January. Gains shown in the use of zinc at brass mills and die casting plants were sufficient to offset a 20-per cent drop in the galvanizing industry.

Receipts of this metal at consumers' plants rose 17 per cent, with all industry groups except galvanizers contributing to the gain.

Copper Output Dips Sharply

The supply of refined copper available from domestic sources during March was seriously reduced by strikes at all but two of the nation's refineries.

Output of refined copper in the month was only 20,139 tons compared with 49,993 tons in February and 69,000 tons in January, according to the Copper Institute.

Shipments of copper to consuming plants in March totaled 58,590 tons against 86,089 tons in February. Domestic metal supplied 24,229 tons of the March shipments against 47,474 tons in February, while foreign sources accounted for 34,361 tons against 38,615 tons.

Mine production also continued at a low point, due to strikes at two big producing properties. This condition will be more fully reflected in future months. For March, total primary production was 41,042 tons compared with 41,667 tons in February. Of this total primary accounted for 37,209 tons, compared with 36,876 tons in February; custom and secondary output was 3,833 tons against 4,791 tons.

Penicillin Export Shipments Soar

Penicillin exports in March totaled 3,450,000 vials, compared with 10,000 vials less than two years ago, the Department of Commerce reports.

These shipments for foreign use, together with 50,000,000,000 units of other penicillin products, were valued at $3,264,644.

The total was more than three times the value of all drugs and medicines exported in 1938. "The export of penicillin," the report said, "has afforded United States manufacturers the opportunity for the first time to enter many foreign markets on a substantial basis which, before World War II, were dominated by Axis or other foreign brands of drugs."

Negotiations for the establishment of penicillin plants in several foreign countries are under way between American producers and foreign government agencies and private commercial interests. As much of the equipment required for penicillin production is in short supply, no priorities have been granted by the Civilian Production Administration for such machinery for foreign plants, except for two in England more than a year ago, the report states.

The United Kingdom is producing penicillin by the deep-tank method in three recently-built plants. The output is largely

CHEMICALS

UNITED STATES PRODUCTION, MARCH 1946

Statistics on the production of chemicals shown in the following table are a continuation of the series initiated on February 7, 1944, in "Facts for Industry," Series 6-1-1. With the end of the war, the list of chemicals covered was reviewed and those presented here were selected for continuation. While considerably curtailed, this group of chemicals and gases is fairly representative of the products of the inorganic chemicals industry, and provides sufficient information for gaging the broad changes in operations from month to month. This list is subject to change if future developments indicate that additional chemicals should be covered or that certain of those on which data are now published have relatively small interest. The figures shown here represent the primary production of the various chemicals in the United States, including quantities produced for consumption in the producing plant, produced for intra-company transfer and produced for sale. Data on consumption and stocks in producing plants, included in this release through September 1945, are no longer collected.

Chemical and Basis	*Unit*	*Production* — *March (Preliminary)*	*Production* — *February (Revised)*
Ammonia, synthetic anhydrous[1]	Short tons	44,271	39,738
Ammonium nitrate (100% NH_4NO_3)	Short tons	42,860	38,543
Ammonium sulfate, synthetic (technical)	M pounds	18,363	17,855
Calcium arsenate (100% $Ca_3(AsO_4)2$)	M pounds	1,478	*1,139
Calcium carbide (commercial)	Short tons	44,460	40,316
Calcium phosphate:			
Monobasic (100% $CaH_4(PO_4)2$)	M pounds	6,610	6,332
Dibasic (100% $CaHPO_4$)	M pounds	7,233	8,083
Carbon dioxide:			
Liquid and gas	M pounds	17,681	15,630
Solid (dry ice)	M pounds	47,654	38,539
Chlorine	Short tons	96,439	*84,741
Chrome green (C.P.)	M pounds	1,981	1,803
Chrome yellow and orange (C.P.)	M pounds	4,739	*4,147
Copper acetoarsenite (Paris green)	M pounds	[2]	[2]
Hydrochloric acid (100% HCl)	Short tons	26,805	*26,791
Hydrofluoric acid:			
Anhydrous (100% H_2F_2)	M pounds		
Technical (100% H_2F_2)	M pounds	3,131	*3,255
Hydrogen	Millions of cubic feet	1,473	1,307
Lead arsenate (acid and basic)	M pounds	7,901	7,567
Methanol (natural) (100% CH_3OH)	M gallons	198	185
Molybdate chrome orange (C.P.)	M pounds	485	397
Nitric acid (100% HNO_3)	Short tons	30,887	*31,123
Oxygen	M cu. ft.	951,418	*606,177
Phosphoric acid (50% H_3PO_4)	Short tons	74,774	*69,525
Silica gel:			
Desiccant grade	M pounds		
Aviation gas catalyst grade	M pounds	4,122	3,171
Silver nitrate (100% $AgNO_3$)	M ounces	3,107	3,442
Soda ash (commercial sodium carbonate):			
Ammonia soda process—			
Total wet and dry (98-100% Na_2CO_3)[3]	Short tons	380,489	342,625
Finished light (98-100% Na_2CO_3)[4]	Short tons	183,038	168,213
Finished dense (98-100% Na_2CO_3)	Short tons	140,500	123,046
Natural (Na_2CO_3 equivalent)[5 6]	Short tons	16,175	*15,684
Sodium bicarbonate (refined) (100% $NaHCO_3$)	Short tons	18,360	13,809
Sodium bichromate and chromate	Short tons	7,777	7,134
Sodium hydroxide (caustic soda):[7]			
Electrolytic process—			
Liquid (100% NaOH)	Short tons	93,335	*81,602
Solid (100% NaOH)	Short tons	15,427	14,713
Lime-soda process—			
Liquid (100% NaOH)	Short tons	66,674	61,646
Solid (100% NaOH)	Short tons	19,365	17,861
Sodium phosphate:			
Monobasic (100% NaH_2PO_4)	Short tons	985	1,116
Dibasic (100% Na_2HPO_4)	Short tons	5,974	5,262
Tribasic (100% Na_3PO_4)	Short tons	9,165	8,429
Meta (100% $NaPO_3$)	Short tons	2,416	2,647
Tetra (100% $Na_4P_2O_7$)	Short tons	4,632	5,125
Sodium silicate:			
Soluble silicate glass, liquid and solid (anhydrous)	Short tons	32,182	*32,494
Sodium sulfate:[8]			
Anhydrous (refined) (100% Na_2SO_4)[9]	Short tons	27,633	22,206
Glauber's salt (100% $Na_2SO_4.10H_2O$)[10]	Short tons	13,619	13,313
Salt cake (crude) (commercial)[11]	Short tons	30,201	27,619
Sulfuric acid:			
Total (100% H_2SO_4)	Short tons	761,646	*665,177
Chamber process (100% H_2SO_4)	Short tons	[12]262,135	[12]*238,184
Contact process (100% H_2SO_4)[13]	Short tons	[14]499,511	[14]*426,993
Net, contact process (100% H_2SO_4)[12 15]	Short tons	[14]448,853	[14]*385,800
Zinc yellow (zinc chromate) (C.P.)	Short tons	[2]	[2]

[1] Data for a small amount of aqua ammonia are included in the figures reported by one company.
[2] Data cannot be published without disclosing operations of individual establishments.
[3] Total wet and dry production, including quantities diverted for manufacture of caustic soda sodium bicarbonate, and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Industry," Series 6-1-1.
[4] Not including quantities converted to finished dense soda ash.
[5] Collected in cooperation with Bureau of Mines.
[6] Revised data for January, 17,158 tons.
[7] Production figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such.
[8] Data for anhydrous sodium sulphate and Glauber's salt have been revised to include certain materials formerly reported under salt cake. These materials, as reported by the Bureau of Mines, have been converted to the indicated basis for inclusion with anhydrous sodium sulphate and Glauber's salt. Revised data for earlier months will be shown in a forthcoming release in this series.
[9] Revised figure for January, 18,936 tons. Included in the January, February and March figures are 8,440 tons, 12,886 tons and 15,442 tons, respectively, collected by the Bureau of Mines and previously reported on a crude basis, under salt cake crude. See note 8 above.
[10] Revised figure for January, 13,756 tons. See note 8 above.
[11] Revised figure for January, 29,055 tons. See note 8 above.
[12] Proportion of estimate, 7 per cent.
[13] Includes sulfuric acid of oleum grade.
[14] Proportion of estimate, 2.5 per cent or less.
[15] Excludes spent acid. For detailed explanation see "Facts for Industry," Series 6-1-1.
* Revised.

Source: Bureau of the Census

required in the British Isles. A Government-owned plant in Australia supplies home needs there and those of New Zealand. A small amount is available for export. The Australian Government denies permits for penicillin imports.

Small amounts are produced in Mexico, whose requirements are supplemented by large imports from the United States, which manufactures more than 90 per cent of the world's supply.

Chemicals Wartime End-Use Distribution

The Bureau of Census, aided by the CPA, is compiling summaries of end-use data on chemicals collected and compiled by the WPB during the war, which will serve to supplement similar information released by the Chemicals Bureau in wartime. Basically, the series will be concerned with civilian end-uses.

The data are subject to several major limitations. First, the end-use patterns are indicative of wartime distribution, which usually differs markedly from peacetime distribution. Too, most of the releases are based on allocations, which vary indeterminately from actual consumption. The initial allocations summarized authorizations for the distribution of the material, and applicants were not obliged to take full allotments. Furthermore, production was sometimes interrupted, transportation difficulties interfered with deliveries, and purchasers' use schedules were disarranged.

A third important limitation is that the ultimate end-use of chemicals allocated directly for military use is indeterminable, and the indicated end-use pattern is correspondingly distorted in cases where such allocations are large. Indirect military use, however, is included, since it was usually identifiable as such through subcontractors.

Nevertheless, although not of prime importance from the standpoint of statistical validity, and bearing in mind the limitations which affect interpretation, the Bureau submits the data as a reasonably accurate indication of wartime distribution.

CASEIN: 1944
(Thousands of pounds, dry basis)

Use	*Amount*	*Per cent*
Allocations[1]	67,604	100.0
Paper[2]	26,150	38.6
Adhesives	9,439	13.9
Paint	5,668	8.4
Plastics	5,518	8.2
Rubber	2,852	4.2
Building materials	1,977	2.9
Food and pharmaceuticals	941	1.4
Textiles	845	1.3
Leather	860	1.3
Insecticides	275	0.4
Miscellaneous uses[3]	13,079	19.4

[1] The new supply of casein for 1944, according to records of the War Food Administration, amounted to 62,108,000 pounds of which 14,883,000 were derived from domestic sources and 47,225,000 were imported.
[2] For the sizing of paper and wallpaper finishing, with the former the more important use.
[3] Includes a large quantity of casein for the manufacture of fibers and small quantities for other end-uses not specified.

BENZENE
(Jan. 1, 1944—June 30, 1945.)
(thousands of gallons)

	Total	
	Amount	*Per cent*
Total Allocations	371,846	100.0
Direct military[1]	1,868	0.5
Foreign	88	[2]
Other uses	369,890	99.5
Aviation gasoline[3]	175,630	47.1
Styrene	80,561	21.7
Phenol	39,911	10.7
Aniline	22,208	6.0
Chlorobenzene	9,403	2.5
Solvents	8,124	2.2
Diphenyls	3,574	1.0
Medicinals	2,100	0.6
Solvent blends[4]	1,376	0.4
Nitrobenzene	1,618	0.4
Rubber chemicals	937	0.3
Trichlorobenzene	246	0.1
Miscellaneous uses[5]	24,202	6.5

[1] End-use data not available.
[2] Less than one-tenth of one per cent.
[3] Includes military aviation fuel.
[4] Blends as defined and controlled by Order M-150.
[5] Includes benzene used in the manufacture of nylon, phthalate plasticizers, maleic anhydride, camphor, anthraquinone, resorcinol, alcohol denaturant, small orders, and other miscellaneous uses not specified. Quantities used in nylon comprise a substantial part of this total. No benzene was allocated for the manufacture of automotive fuel during this period.

NORMAL BUTYL ALCOHOL
(Jan. 1, 1944—June 30, 1945)
(thousands of pounds)

	Total	
	Amount	*Per cent*
Total Allocations	256,090	100.0
Direct military[1]	2	0.0
Export	23,578	9.2
Other essentials	232,510	90.8
Chemical manufacture	151,272	59.1
Butyl acetate	75,060	29.3
Dibutyl phthalate	48,032	18.8
Other butyl derivatives[2]	28,180	11.0
Lacquer solvents	39,268	15.3
Aircraft coatings	21,771	8.5
Ammunition coatings	2,600	1.0
Textile and leather	794	0.3
Dyes and penetrants	1,478	0.5
Other protective coatings	12,625	5.0
Other uses	41,970	16.4
Resins and plastics	7,103	2.8
Photography and films	2,205	0.9
Hydraulic brake fluids	2,867	1.1
Oil additives	686	0.3
Miscellaneous uses and small orders[3]	29,109	11.3

[1] End-use data not available.
[2] Includes normal butyl alcohol used to make butyl cellosolve and butyl amines.
[3] Includes normal butyl alcohol used to make cellulose acetate sheets, insect repellants, medicinals, flotation reagents, butyric acid, cleaners and dehydrating agents, and for research.

CONSUMPTION OF ANILINE: 1944
(thousands of pounds)

Use	*Amount*	*Per cent*
Total Consumption	89,785	100.0
Direct military[1]	5,546	6.2
Foreign	1,696	1.9
Other uses	82,543	91.9
Rubber chemicals[2]	46,137	51.4
Dyestuffs, pigments, intermediates	19,350	21.5
Drugs and pharmaceuticals[3]	3,808	4.2
Explosives and stabilizers	3,030	3.4
Photographic chemicals	1,935	2.2
Petroleum refining[4]	1,572	1.8
Resins and plastics	1,553	1.7
Miscellaneous uses and small orders[5]	5,158	5.7

[1] End-use data not available.
[2] Synthetic rubber additives such as cyclohexylamine, diphenylamine and hydroquinone.
[3] Aniline reserved largely for the manufacture of sulfa drugs.
[4] For the preparation of emulsion breakers, petroleum additives, gasoline gum inhibitors, and oil corrosion inhibitors.
[5] Flotation products, paraciticides, mildew inhibitors, etc. About 163,000 pounds were allocated under the small order exemption clause of the allocation control order.

FORMALDEHYDE: 1944
(Thousands of pounds, 37%)

Use	*Amount*	*Per cent*
Total	485,292	100.0
Direct military[1]	1,331	0.3
Foreign	7,524	1.5
Other uses	476,437	98.2
Resins, total	243,375	50.3
Phenolic	137,942	28.4
Urea and melamine	101,048	21.0
Other resins[2]	4,385	0.9
Chemical, total	199,409	41.0
Hexamethylenetetramine	64,407	13.3
Pentaerythritol	55,367	11.4
Rubber chemicals	2,537	0.5
Other chemicals[3]	77,098	15.8
Other uses	33,653	6.9
Textiles	7,998	1.7
Dyes and intermediates	3,498	0.7
Leather	2,640	0.5
Embalming fluid	1,148	0.2
Drugs and pharmaceuticals[4]	804	0.2
Paper	624	0.1
Adhesives and protective coatings	592	0.1
Disinfectants and insecticides[5]	492	0.1
Photography	465	0.1
Miscellaneous uses and small orders[6]	15,392	3.2

[1] End-use data not available.
[2] Includes formaldehyde used in the manufacture of synthetic resins such as polyvinyl, casein, cashew, phthalic alkyd, and dimethylurea.
[3] Includes formaldehyde used for the manufacture of ethylene glycol, paraformaldehyde, hydroxyacetic acid, citric acid, chlorine, methoxyethanol and methyl hydroxyacetate.
[4] Roughly half of this quantity was used for processing penicillin.
[5] Includes germicides and fungicides.
[6] Formaldehyde used in the manufacture of theobromine, explosives, boiler-water treating compounds, metal treating agents, processed oils, other miscellaneous uses, and in research.

PHENOL: 1944
(Thousands of pounds)

Use	*Amount*	*Per cent*
Total Allocations	205,186	100.0
Direct military[1]	20,702	10.1
Foreign	23,307	11.3
Other uses	161,177	78.6
Phenolic resins	106,655	52.0
Chemical manufacture[2]	11,806	5.7
Salicylates	11,264	5.6
Petroleum refining[3]	10,857	5.2
Disinfectants and insecticides[4]	5,707	2.8
Triphenyl phosphate and other plasticizers	4,585	2.2
Toluene extraction	4,262	2.1
Dyes and inks	2,187	1.1
Medicinals, other than salicylates	1,733	0.8
Miscellaneous uses and small orders	2,121	1.1

[1] End-use data not available.
[2] Includes substituted phenols.
[3] Includes phenol used in oil additives and oil refining materials.
[4] Includes chlorinated phenols.

PHTHALIC ANHYDRIDE: 1944
(Thousands of pounds)

Use	*Amount*	*Per cent*
Total consumption	124,473	100.0
Foreign export	2,324	1.9
Other uses	122,149	98.1
Esters (plasticizers)[1]	68,793	55.3
Resins (principally alkyd resin)	38,113	30.6
Dyestuffs	10,917	8.8
Food and drugs	3,114	2.5
Petroleum additives (principally demulsifying agents)	565	0.4
Chemical intermediates	358	0.3
Rubber chemicals (principally vulcanization accelerators)	144	0.1
Miscellaneous uses and small orders[2]	145	0.1

[1] Largely in the form of dibutyl phthalate, but includes some methyl, ethyl and amyl esters.
[2] Includes such uses as in paints, lacquers, enamels and resin softeners. Small orders were limited to 10 pounds per customer per month.

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CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
May, 1944, $0.890 *May, 1945, $0.870*
May, 1946, $0.835

		Current		1946		1945	
		Low	High	Low	High	Low	High
Acetaldehyde,99%,drs.wks.	lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs,	lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv.	lb.	.06	.07	.06	.07	.06	.07
ACIDS							
Acetic, 28%, bbls	100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls.	100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks.	100 lbs.	6.93	7.25	6.93	7.25	6.93	7.25
Acetylsalicylic, Standard USP	lb.	.40	.54	.40	.54	.40	.54
Benzoic, tech. bbls.	lb.	.43	.47	.43	.47	.43	.47
USP, bbls, 4,000 lbs. up	lb.	...	.54	...	.54	...	.54
Boric tech, bbls. c-l.	tons *a*	...	109.00	...	109.00	...	109.00
Chlorosulfonic, drs, wks.	lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls.	lb. *b*	.20	.21	.20	.21	.20	.21
Cresylic 50%, 210-215° HB, drs. wks. frt. equal	gal.	.81	.96	.81	.96	.81	.83
Formic, 85%-90% cbys.	lb.	.10	.11½	.10	.11½	.10	.11½
Hydrofluoric, 30% rubber, dms.	lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks	lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks	lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs	lb.	.25	.26	.25	.26	.25	.26
Muriatic 18° cbys	100 lb.	1.50	2.45	1.50	2.45	1.50	2.45
20° cbys, c-l, wks.	100 lb.	...	1.75	...	1.75	...	1.75
22° cbys, c-l, wks.	100 lb.	...	2.25	...	2.25	...	2.25
Nitric,36°,cbys, wks 100 lbs.	*c*	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, cbys, wks 100 lbs.	*c*	...	5.50	...	5.50	...	5.50
40°, c-l, cbys, wks 100 lbs.	*c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lbs.	*c*	...	6.50	...	6.50	...	6.50
Oxalic, bbls, wks	lb.	.11¼	.12½	.11¼	.12½	.11¼	.12½
Phosphoric, 100 lb. cbys, USP	lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic tech, bbls	lb.	.26	.42	.26	.42	.26	.42
Sulfuric, 60°, tks, wks	ton	...	13.00	...	13.00	...	13.00
66°, tks, wks	ton	...	16.50	...	16.50	...	16.50
Fuming 20% tks, wks.	ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls	lb.	.62½	.63	.62½	.71	.70½	.71
Alcohol, Amyl (from Pentane) tks, delv	lb.	...	.131	...	.131	...	.131
Butyl, normal, syn, tks	lb.	...	.10¾	...	.10¾	...	.10¾
Denatured, CD 14, c-l drs	gal. *d*	...	.613	...	.613	...	.59
Denatured, SD, No. 1, tks.	*d*	...	.542	...	.542	...	.52
Ethyl, 190 proof tks.	gal.	...	17.65½	...	17.65½	...	17.60
Isobutyl, ref'd, drs	lb.	...	.0660	...	.0660	...	.086
Isopropyl ref'd, 91%, dms	gal.	.38	.41	.38	.41	.37½	.66½
Alum, ammonia, lump, bbls, wks	100 lb.	...	4.25	...	4.25	...	4.25
Aluminum, 98-99%	100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks	lb.	.09	.12	.09	.12	.08	.12
Hydrate, light, bgs.	lb.	...	.14½	...	.14½	.14½	.15
Sulfate, com'l. bgs, wks, c-l	100 lb.	1.15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks	100 lb.	1.75	2.00	1.75	2.00	1.75	2.10
Ammonia anhyd, cyl	lb.	...	.14½	...	.14½	...	.14½
Ammonia, anhyd. fert. tank cars, wks. frt. equalized	ton	...	59.00	...	59.00	...	59.00
Ammonium Carbonate, USP, lumps, dms	lb.	.08¼	.09½	.08¼	.09½	.08¼	.09¼
Chloride,whi,bbls,wks,100 lb.		4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bags, wks.	lb.	.0435	.0450	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls.	lb.	...	.23	...	.23	.27	.33
Perchlorate, kgs	lb.	no stocks		no stocks		no stocks	
Phosphate, dibasic tech. bgs	lb.	.07	.07¾	.07	.07¾	.07	.08½
Stearate, anhyd. dms.	lb.	...	.34	...	.34	...	.34
Sulfate, dms, bulk	ton	28.20	29.20	28.20	29.20	28.20	29.20
Amyl Acetate (from pentane) tks., delv.	lb.	...	.14½	...	.14½	...	.15½
Aniline, Oil, drs	lb.	.11½	.12½	.11½	.12½	.11½	.12½
Anthraquinone, sub, bbls.	lb.	...	.70	...	.70	...	.70
Antimony Oxide, bgs	lb.	.16	.17	.15	.17	.15	.16
Arsenic, whi, kgs—powd.	lb.	.04	.04¼	.04	.04¼	.04	.04¼

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs less in each case; *d* Prices given are Eastern schedule. *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher.

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Barium Carbonate precip, wks, bgs. ton	60.00	75.00	60.00	75.00	60.00	75.00
Chloride, tech, cyst, bgs, zone 1 ton	73.00	78.00	73.00	78.00	73.00	78.00
Barytes, floated, bbls. ton	...	36.00	...	36.00	...	36.00
Bauxite, bulk mines ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, ft all'd gal.	...	.15	...	.15	...	.15
Benzyl Chloride, cbys lb.	.20	.21	.20	.24	.22	.24
Beta-Naphthol, tech, bbls, wks ton	.21	.23	.21	.24	.23	.24
Bismuth metal, ton lots lb.	...	1.25	...	1.25	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks ton	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks,100 lb.	2.50	3.10	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs ton	...	45.00	...	45.00	...	45.00
Bordeaux Mixture, drs lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases lb.	.21	.23	.21	.23	.21	.30
Butyl, acetate, norm. drs lb.	.2105	.2155	.1860	.2155	17.90	19.45
Cadmium Metal lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs, 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs ton	50.00	90.00	50.00	90.00	50.00	95.00
Carbonate, c-l bgs ton	18.00	22.00	18.00	22.00	18.00	22.00
Chloride, flake, bgs c-l ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75⅔ drs, c-l, ton	18.00	34.50	18.00	34.50	18.00	34.00
Cy'n'd, min. 21% N, c.l. lb.	.02¼	.02¾	...	...	...	...
Gluconate, U.S.P., drs. lb.	.57	.59	.57	.59	.57	.59
Phosphate, tri, bbls, cl. lb.	...	.0635	...	.0635	...	.0635
Camphor, U.S.P., gran, powd, bbls lb.	.69	.71	.69	.71	.69	.71
Carbon Bisulfide, 55-gal drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms gal.	.69	.76	.69	.80	.73	.80
Casein, Acid Precip, bgs, 100 or more lb.	...	.33	.24	.33	...	.24
Chlorine, cyls, lcl, wks, contract lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract lb.	...	.05¼	...	.05¼	...	.05¼
Liq. tk, wks, contract 100 lb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt, Acetate, bbl lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs lb.	...	1.84	...	1.84	...	1.84
Copper, metal 100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls. lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks cryst. 100 lb.	5.00	5.50	5.00	5.50	5.00	5.50
Copperas, bulk, c-l, wks ton	...	14.00	...	14.00	...	14.00
Cresol, USP, drs lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
Dibutylamine, c-l, drs, wks,	...	.66	...	.66	...	.66
Dibutylphthalate, drs lb.	.1700	.2359	.1700	.2359	.1770	.2359
Diethylaniline, lb drs lb.	...	.40	...	.40	...	.40
Diethyleneglycol, drs, wks lb.	.14	.15	.14	.15	.14	.15½
Dimethylaniline, dms,cl.,lcl lb.	.21	.22	.21	.22	.23	.24
Dimethyl phthalate, drs lb.	.20	.20½	.20	.20½	.20	.20½
Dinitrobenzene, bbls lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks. lb.	.16	.20	.16	.20	.16	.20
Diphenylamine bbls lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs lb.	.35	.37	.35	.37	.35	.37
Ethyl Acetate, tks, frt all'd lb.	.0950	.1175	.0950	.1175	.0975	.1175
Chloride, drs lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms lb.	.0891	.0941	.0842	.0941	.0842	.0941
Glycol, dms, cl. lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd.95-98% bulk, cl-mines ton	...	37.00	...	37.00	...	37.00
Formaldehyde, bbls, cl & lcl lb.	.0520	.0570	.0520	.0570	.0520	.0570
Furfural tech, dms, c-l,wks lb.	...	.13	...	.13	...	.13
Fusel Oil, ref'd, dms, dlvd lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst, c-l, bgs, bbls, wks 100 lb.	1.05	1.45	1.05	1.45	1.05	1.45
Glycerine dynamite, dms, c-l, lb.	.17½	.18¾	.17½	.18¾	...	.16½
Crude Saponification, 80% to refiners tks lbs.	...	.11½	...	.11	.09½	.11½

GUMS

Gum Arabic, amber sorts bgs lb.	.14¼	.14¾	.11¾	.14¾	.11	.13
Benzoin Sumatra, CS lb.	.52	1.00	.52	1.00	.52	1.00
Copal, Congo lb.	...	.55¾	...	.55¾	...	.55¾
Copal, East India, chips lb.	...	.53¾	...	.53¾	...	.53¾
Macassar dust lb.	...	.07⅛	...	.07⅛	...	.07⅛
Copal Manila,	.13½	.15½	.13½	.15½	.13½	.15½
Copal Pontianak, bold c-l lb.	...	.17⅛	...	.17⅛	...	.23⅛
Karaya, bbls, bxs, dms. lb.	.21	.50	.18	.50	.15	.46

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

AHCO PRODUCTS

METHYL "CELLOSOLVE"* STEARATE

METHYL "CELLOSOLVE" STEARATE, a synthetic ester, is used as a plasticizer for cellulose derivative, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula, $C_{17}H_{35}COOCH_2CH_2OCH_3$
Molecular weight 342
Color (platinum cobalt scale) 175
Melting point ..... 22° to 24°C
Flash point ..... 378°F
Acidity, less than .6 mg. KOH per gram ester
Specific gravity ..... .888 at 25°/25°C
Iodine value ..... 2 max.

Low volatility

* Trade mark of C&CCC

★

BUTYL STEARATE

BUTYL STEARATE, a synthetic ester, is used as a plasticizer for cellulose and polyvinyl derivatives, also for cosmetics, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula ..... $C_{17}H_{35}COOC_4H_9$
Molecular weight 341
Color (platinum cobalt scale) 130
Melting point ..... 19° to 20°C
Flash point ..... 358°F
Acidity, less than .6 mg. KOH per gram ester
Saponication number, 171-179 mg. KOH per gram ester
Specific gravity ..... .85-.86 at 20°/20°C
Iodine value ..... 2 max.

Low volatility

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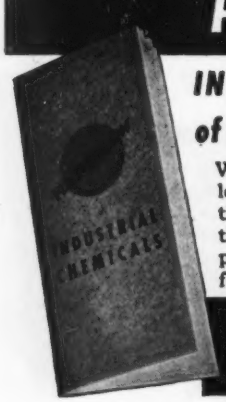

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BRANCHES IN PRINCIPAL CITIES

Current Prices

Gums
Salt Lake

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Kauri, N. Y.						
Superior Pale XXX....lb.	...	.65¾	...	.65¾	...	.65¾
No. 3 .....lb.	...	.22	...	.22	...	.22
Sandarac, cs .....lb.	.97½	.99½	.97½	.99½	...	.99½
Tragacanth, No. 1, cases ..lb.	4.25	4.30	3.75	4.30	3.80	5.00
No. 3 .....lb.	2.75	2.80	2.10	2.80	2.15	3.00
Yacca, bgs .....lb.	.05	.07¼	.05	.07¼	.06	.07¼
Hydrogen Peroxide, cbys ..lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars..lb.	1.75	1.85	1.75	1.85	1.75	2.10
Lead Acetate, cryst, bbls...lb.	...	.12½	...	.12½	...	.12½
Arsenate basic, bg, lcl..lb.	.12	.12½	...	.12	.11½	.12
Nitrate, bbls. .....lb.	...	.12½	...	.12½	...	.12½
Red, dry, 95% Pb_3O_4 bbls. .....lb.	.09	.10¾	.09	.10¾	.09	.10¾
97% Pb_3O_4, bbls delv..lb.	.09½	.11	.09½	.11	.09¼	.11
98% Pb_3O_4, bbls delv..lb.	.09½	.11¼	.09½	.11¼	.09½	.11¼
White, bbls .....lb.	.08¼	.08¾	.08¼	.08¾	.08¼	.08¾
Basic sulfate, bbls, lcl lb.	.07¾	.08	.07¾	.08	.07¼	.08
Lime, Chem., wks, bulk..ton	6.50	9.25	6.50	9.25	6.25	13.00
Hydrated, f.o.b. wks ..ton	8.50	12.00	8.50	12.00	8.50	16.00
Litharge, coml, delv. bbls..lb.	.08	.09¼	.08	.09¼	.08	.09¼
Lithopone, ordi., bgs .....lb.	.04¼	.04½	.04¼	.04¾	.04¼	.04¾
Magnesium Carb, tech, wks lb.	.07¼	.10¾	.07¾	.10¾	.06¼	.10¾
Chloride flake, bbls, wks c-l .....ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, Anhyd. bbls. .....lb.	.14	.16	.14	.18	.15	.18
Dioxide, Caucasian bgs, lcl .....ton	74.75	79.75	74.75	79.75	74.00	79.75
Methanol, pure, nat, drs gal *l*	.63	.73	.63	.73	.63	.76
Synth, drs cl .....gal. *m*	.31	.38	.24	.38	.31	.38
Methyl Acetate, tech tks..lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, cyl .....lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone,tks,frt all'd lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks ...gal.	...	.27	...	.27	...	.27
Naphthalene, crude, 74°, wks tks .....lb.	...	.0275	...	.0275	...	.0275
Nickel Salt, bbls, NY ....lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk .....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks ...lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls .....lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs ...lb.	.25	.27	.25	.27	.25	.27
Orthodichlorobenzene, drms lb.	.07	.08	.07	.08	.07	.08
Orthonitrochlorobenzene, wks .....lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks, dms lb.	...	.09	...	.09	...	.09
Paraldehyde, 98%, wks lcl .....lb.	...	.12	...	.12	...	.12
Chlorophenol, drs .....lb.	.24	.27	.24	.27	.25	.32
Dichlorobenzene, wks ...lb.	.11	.15	.11	.15	.11	.15
Formaldehyde, drs, wks lb.	.21	.22	.21	.22	.21	.22
Nitroaniline, wks, kgs...lb.	.41	.43	.41	.45	.43	.45
Nitrochlorobenzene, wks lb.	...	.15	...	.15	...	.15
Toluenesulfonamide, bbls lb.	...	.70	...	.70	...	.70
Toluidine, bbls, wks ...lb.	...	.48	...	.48	...	.48
Penicillin, ampules per 100,00 units	.60	.75	.55	.95	.59	2.40
Pentaerythritol, tech ...lb.	.27	.31	.27	.31	.27	.33

PETROLEUM SOLVENTS AND DILUENTS

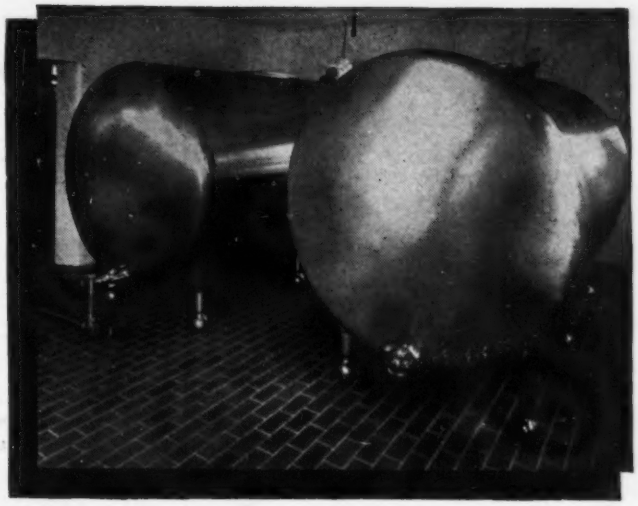
Lacquer diluents, tks, East Coast .....gal.	...	.11½	...	.11½	...	.11
Naphtha, V.M.P., East tks, wks .....gal.	...	.11	...	.11	...	.11
Rubber solvents, East, tks, wks .....gal.	...	.11	...	.11	...	.11
Stoddard Solvents, East, tks, wks .....gal.	...	.10	...	.10	...	.10

Phenol, U.S.P., drs .....lb.	.10½	.11¼	.10½	.11¼	.10½	.11¼
Phthalic Anhydride, cl and lcl, wks .....lb.	.13	.14	.13	.14	.13	.14
Potash, Caustics, 88-92%, wks, sol. .....lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
Flake, 88-92% .....lb.	.07	.07½	.07	.07½	.07	.07½
liquid, 45% basis, tks lb.	...	.02⅞	...	.02⅞	...	.0275
dms, wks .....lb.	.03¼	.03½	.03	.03½	.03	.03½
Carbonate, hydrated 83-85% .....lb.	...	.05½	...	.05½	.05½	.05¾
Chlorate crys, bgs, wks lb.	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs .....lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks .....lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans ...lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriatic dom, 60-62-63% KsO bulk unit-ton ...ton	...	.53½	...	.53½	.53½	.56
Permanganate, USP, wks dms .....lb.	.20½	.21	.20½	.21	.20½	.21
Sulfate, 90%, basis, bgs ton	...	36.25	...	36.25	...	36.25
Propane, group 3, tks....gal.	...	.03¾	...	.03¾	...	.03¾
Pyridine, ref., drms .....lb.	.45	.45½	.45	.45½	.45½	.46
R Salt, 250 lb bbls, wks lb.	...	.65	...	.65	...	.65
Resorcinol, tech, drms, wks lb.	.64	.74	.64	.74	.64	.75
Rochelle Salt, cryst .....lb.	.38½	.42	.38½	.47	.43½	.47
Salt Cake, dom, blk wks..ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.
* Spot price is ½c higher.

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Saltpeter, grn, bbls. ..100 lb.	8.20	8.60	8.20	8.60	8.20	8.60
Shellac, Bone dry, bbls..lb. r	.42½	.46	.42½	.46	.42½	.46
Silver Nitrate, 100 oz, bots 2,500-oz. lots .....oz.	.47	.47¾	.47	.47¾	.47	.47¾
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs cl....100 lb.	1.05	1.18	1.05	1.18	1.05	1.13
Caustic, 76% flake drms, cl .....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms,cl 100 lb.	...	2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks .....100 lb.	...	1.95	...	1.95	...	1.95
Sodium Acetate, anhyd. drms .....lb.	.08½	.10	.08½	.10	.08½	.10
Benzoate, USP dms ....lb.	.46	.52	.46	.52	.46	.52
Bicarb, tech., bgs., cl., works .....100 lb.	1.55	1.90	1.55	1.90	1.55	1.90
Bichromate, bgs,wks l.c.l. lb.	.07⅞	.08⅛	.07⅞	.08⅛	.07½	.08⅛
Bisulfate powd, bbls, wks .....100 lb.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks .....100 lb.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c.l....lb.	....	.06½	...	.06¾	...	.06¼
Cyanide, 96-98%, wks ..lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks lb.	.07¼	.08¼	.07¼	.08¼	.07¼	.08¼
Hyposulfite, cryst, bgs, cl, wks .....100 lb.	...	2.25	...	2.25	...	2.25
Metasilicate, gran, bbl, wks c-l .....lb.	...	2.50	...	2.50	...	2.50
Nitrate, imp, bgs .....ton	...	33.00	...	33.00	...	33.00
Nitrite, 96-98% bbl. cl. lb.	...	.06¾	...	.06¾	...	.06¾
Phosphate, di anhyd. bgs. wks. .....100 lb.	6.00	6.75	6.00	6.75	6.00	7.25
Tri-bgs, cryst, wks 100 lb.	2.70	3.10	2.70	3.10	2.70	3.45
Prussiate, yel, bbls. wks lb.	...	.11	...	.11	...	.11
Silicate, 52°, drs, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
40°, drs, wks, c-l 100 lb.	...	.80	...	.80	...	.80
Silicofluoride, bbls NY .lb.	.06½	.07½	.06½	.10	.06½	.10
Sulfate tech, Anhyd, bgs .....100 lb.	1.70	2.20	1.70	2.20	1.70	2.20
Sulfide, cryst c-l, bbls, wks .....100 lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, wks .....lb.	3.15	3.90	3.15	3.90	3.15	3.90
Starch, Corn, Pearl, bgs .....100 lb.	...	4.08	...	4.08	...	4.08
Potato, bgs, cl .....lb.	...	.0637	...	.0637	...	.0637
Rice, bgs .....lb.	no stocks		no stocks		no stocks	
Sweet Potato, bgs .....lb.	no stocks		no stocks		no stocks	
Sulfur, crude, mines ....ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs .....lb.	.18	.30	.18	.30	.18	.30
Roll, bbls .....100 lb.	2.40	2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl lb.	.07	.08	.07	.08	.07	.09
tks, wks .....lb.	...	.04	...	.04	...	.04
Talc, crude, c-l, NY ....ton	...	13.00	...	13.00	...	13.00
Ref'd, c-l, NY .....ton	13.00	21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks. ..lb.	no stocks		no stocks		no stocks	
Metal .....lb.	...	.52	...	.52	...	.52
Toluol, drs, wks .....gal.	...	.32	...	.32	...	.33
tks, frt all'd .....gal.	...	.27	...	.27	...	.28
Tributyl Phosphate, dms lcl, frt all'd .....lb.	...	.49	...	.49	...	.47
Trichloroethylene,dms,wks lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate tks ...lb.	...	.24	...	.24	...	.24
Triethylene glycol, dms....lb.	.18½	.19½	.18½	.19½	.18½	.19½
Triphenyl Phos, bbls .....lb.	.31	.32	.26	.32	.26	.31
Urea, pure, cases .....lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs .....lb.	no stocks		no stocks		no stocks	
Bees, bleached, cakes ..lb.	.68	.70	.60	.70	no-stocks	
Candelilla, bgs crude ..lb.	.75	.78	.62	.78	.35	.36
Carnauba No. 1, yellow, bgs, ton .....lb.	1.90	1.95	1.80	1.95	no stocks	
Xylol, Indus. frt all'd, tks, wks .....gal.	...	.26	...	.26	...	.27
Zinc Chloride tech fused, wks .....lb.	.05	.0535	.05	.0535	.05	.0535
Oxide, Amer, bgs, wks..lb.	.07¼	.07½	.07	.07½	.07	.07½
Sulfate, crys, bgs...100 lb.	3.40	4.15	3.40	4.15	3.40	4.15
OILS AND FATS						
Babassu, tks, futures .....lb.	...	.111	...	.111	...	.111
Castor, No. 3, bbls .....lb.	.13¾	.15½	.13¾	.15½	.13¾	.14¼
China Wood, drs, spot NY lb.	.39	.41	.39	.41	.39	.41
Coconut, edible, drs NY...lb.	...	.0985	...	.0985	...	.0985
Cod Newfoundland, dms..gal.	.88	.90	.88	.90	.85	.90
Corn, crude, tks, wks ....lb.	...	.12¾	...	.12¾	...	.12¾
Linseed, Raw, dms, c-l ...lb.	...	.1550	...	.1550	...	.1550
Menhaden, tks	...	.1225	...	.1225	...	.1225
Light, pressed, drs l.c.l lb.	...	.1300	...	.1300	...	.1300
Palm, Niger, dms .....lb.	...	.0865	...	.0865	...	.0865
Peanut, crude, tks, f.o.b. wks .....lb.	.12⅞	.13⅞	.12⅞	.13⅞	.12⅞	.13⅞
Perilla, crude dms, NY ..lb.	no stocks		no stocks		no stocks	
Rapeseed, New Orleans, bulks .....lb.	...	.13	...	.13	...	.156½
Red, dms .....lb.	.13¼	.14¼	.13¼	.14¼	.12¼	.14¼
Soy Bean, crude, tks, wks lb.	...	.1175	...	.1175	...	.1175
Tallow, acidless, bbls.....lb.	...	.14¼	...	.14¼	...	.14¼

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y., refined 6c higher in each case.



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Although competition will be keen in the export field a substantial demand for U. S. chemicals exists, particularly in view of the fact that the elimination of Germany and Japan opens up a $300 million market.

Current indications are that the U. S. will be called upon to supply the lion's share of the world's dyestuffs, as well as refrigerants worth about $1.5 million, and $10 million in insecticides. Foreign sales of fertilizers are expected to top $20 million, with plastics in the same bracket, and pigments and paints exceeding $30 million.

Awarded Contract for French Plant

Chemical Construction Corp. has been awarded a contract by Office National de l'Azote, of France, to design and furnish the materials and equipment for a gas reforming plant to be constructed in Toulouse, France, on the Garonne River.

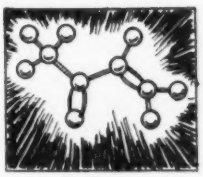
The new plant, utilizing the methane steam process, will convert natural gas, by high temperature cracking, into hydrogen and nitrogen for use in the synthesis of ammonia. It will have a charging capacity of approximately 20,000,000 cubic feet of natural gas daily.

Announcing THE 2ND Annual

"NEW CHEMICALS & NEW EQUIPMENT ISSUE"

of Chemical Industries August, 1946

WHAT THE ISSUE IS ABOUT



"NEW CHEMICALS FOR INDUSTRY"
properties, uses, availability, manufacturers

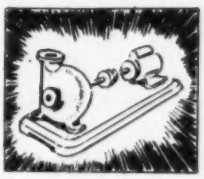
With the American Chemical Industry on the threshold of its greatest privately financed expansion, CHEMICAL INDUSTRIES announces its 2nd Annual "New Chemicals & New Equipment Issue," timed to coincide with the National Chemical Exposition at Chicago in September.

The August issue of CI will contain four special sections of particular interest—new chemical products, new processing equipment, new packaging for chemicals, and new chemical specialties.

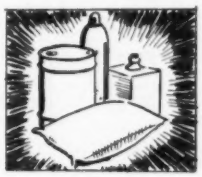
The theme of this special issue will be: "An *understanding of current trends* and a *knowledge of specific new developments* are essential tools for the achievement of more profitable chemical business."

Thus each section will have two parts: First—An editorial article will review the significant overall trends to give the reader a comprehensive picture of the implications of recent industry advances, and to provide a background for gaging progress and evaluating the shape of future developments. Second—A detailed catalogue of specific new developments will furnish a knowledge of the tangible tools with which the industry can carry out its plans for a bigger and better future. In order to summarize specific advances in each category, CI is conducting a survey of manufacturers of chemicals, equipment, packages, and specialties to determine what new products they have introduced in the past two years.

Besides these four special sections, the August issue will contain all of CI's regular features and departments.



"NEW PROCESS EQUIPMENT"
types, sizes, construction, applications, manufacturers



"NEW PACKAGING FOR CHEMICALS"
types, sizes, construction, uses, manufacturers

"NEW CHEMICAL SPECIALTIES"
properties, forms, uses, availability, manufacturers

WHY YOU SHOULD ADVERTISE IN IT

Your "ad" in the August issue of CHEMICAL INDUSTRIES will have a maximum of selling value. The reader's attention will be focused on the trend of new developments. His interest will be directed toward the specific new products available to him. His desire will be augmented for acquiring the benefits of these new machines, materials and supplies in his own expansion plans. But, *only your "ad"* can tell the story of your own products with sufficient emphasis to make the CI reader your customer.

Chemical Industries

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INDEX *of* ADVERTISERS

Adhesive Products Co. ... 1037
Advance Solvents & Chem. Corp. ... 1058
Alabama Power Co. ... 930
Allied Asphalt & Mineral Corp. ... 1068
Alrose Chemical Co. ... 1009
Amecco Chemicals, Inc. ... 1031
Amend Drug & Chemical Co., Inc. ... 1022
American Cyanamid & Chemical Corp. ... 1033, 914 and 915
American Potash & Chemical Corp. ... 1041
Ansul Chemical Co. ... 1034
Arnold-Hoffman & Co., Inc. ... 1059
Aromatics Division, General Drug Co. ... 999
Association of Consulting Chemists & Chemical Engineers ... 1066
Atlas Powder Co. ... 913

Baker, J. T. Chemical Co. ... 921
Baker & Adamson, Division of General Chemical Co. ... 945
Baker Castor Oil Co. ... 923
Barclay Chemical Co. ... 1065
Bareco Oil Co. ... 1047
Barrett Division, Allied Chemical & Dye Corp. ... 950
Beacon Co. ... 998
Bemis Bros. Bag Co. ... 1017
Berlage, J. Co. ... 1041
Bjorksten Laboratories ... 1066
Black-Sivalls & Bryson ... 1021
Blaw-Knox Co. ... 1005
Bower, Henry, Chemical Mfg. Co. ... 1009
Brill Equipment Co. ... 1063
Buckeye Cooperage Co. ... 1063
Burkart-Schier Chemical Co. ... 1052
Burke, Edward S. ... 1060

C. P. Chemical Solvents, Inc. ... 1062
Carbide & Carbon Chemicals Corp. ... 925
Chemical Construction Co. ... 916
Church & Dwight Co., Inc. ... 1021
Claflin, Alan A. ... 1062
Columbia Chemical Division, Pittsburgh Plate Glass Co. ... 993, 1027
Columbia Organic Chemicals Co., Inc. ... 1000
Commercial Plastics Co. ... 997
Commercial Solvents Corp. ... 956
Consolidated Chemical Industries, Inc. ... 1037
Consolidated Products Co. ... 1064
Continental Can Co. ... 1019
Cornelius Products Co. ... 1039
Corning Glass Works ... 948
Cowles Detergent Co. ... 1025
Crosby Chemicals, Inc. ... 1043
Croton Chemical Corp. ... 1025

Dallal, D. S., & Co. ... 1000
Despatch Oven Co. ... 1008
Diamond Alkali Co. ... 919, 955
Distributing & Trading Co. ... 1025
Doe & Ingalls, Inc. ... 1062
Dow Chemical Co. ... 910
Dunkel, Paul A. & Co., Inc. ... 1022

Eastern Steel Barrel Corp. ... 1057
Edwal Laboratories, Inc. ... 1025
Eimer & Amend ... 917
Emsco Equipment Co. ... 1064
Evans Chemetics, Inc. ... 998
Evans, Ralph L., Associates ... 1066

Fairmount Chemical Co. ... 1022
Fergusson, Alex C., Co. ... 1062
Filter Paper Co. ... 1042
Fine Organics, Inc. ... 998
First Machinery Corp. ... 1063
Fisher Chemical Co. ... 1069
Fisher Scientific Co. ... 917
Franks Stearate Div., Witco Chemical Co. ... 1052
Fritzsche Brothers, Inc. ... 1040
Fulton Bag & Cotton Mill ... 1018

Gelb, R. & Sons, Inc. ... 1063
General Chemical Co. ... Inside Back Cover
General Drug Co., Aromatics Division ... 999
Glycerine Producers' Association ... 947
Goodrich, The B. F., Chemical Co. ... 922
Gotham Instrument Co. ... 1004
Gray, William S., & Co. ... 1000
Greeff, R. W., & Co. ... 1060
Greenspon's, Jos., Son Pipe Corp. ... 1064

Haering, D. W. & Co., Inc. ... 1021
Hallowell, Horace J. ... 1066
Hardesty Chemical Co., Inc. ... 907
Hardesty, W. C., Co. ... 926
Harshaw Chemical Co. ... 1060
Heekin Can Co. ... 1069
Hema Drug Co. ... 1062
Heyden Chemical Corp. ... 995
Hooker Electrochemical Co. ... 951
Houston Pipe Line Co. ... 918
Huisking, Chas. L., & Co. ... 908
Hunt Chemical Works, Inc. ... 1052

Industrial Chemical Sales Division, West Virginia Pulp & Paper Co. ... 924
Industrial Raw Materials Co. ... 1062
Innis Speiden & Co. ... 1042

Jefferson Lake Sulphur Co., Inc. ... 1057

INDEX *of* ADVERTISERS

Kelco Co. 937
Kessler Chemical Co. 927
Kidde, Walter, & Co., Inc. 1003
King, E. & F., & Co., Inc. 1062
Knight, Maurice A. 1007
Koppers Co. 920
Koster Keunen Mfg. Co. 1045

Lamex Chemical Corp. 1044
LaPine, Arthur S., & Co. 1062
Leeds & Northrup Co. 1012
Lemke, B. L., & Co., Inc. 1049
Loeb Equipment Supply Co. 1064
Lucidol Corp. 1043

Machinery & Equipment Corp. 1064
Mallinckrodt Chemical Works 928
Mann, George & Co., Inc. 1062
Marine Magnesium Products Corp. 929
Mathieson Alkali Works, Inc. 906
Merck & Co., Inc. 1071
Metalsalts Co. 1037
Millmaster Chemical Co. 1062
Mine & Smelter Supply Co. 1044
Moesch, Walter & Co. 1038
Molnar Laboratories 1066
Monsanto Chemical Co. 989
Mutual Chemical Co. of America 909

National Aniline Div., Allied Chem. & Dye Corp. 1023
National Chemical Exposition 1051
National Technical Laboratories 996
Natural Products Refining Co. 952
Newberry Mfg. Co. 1064
Niacet Chemicals Div. 1032
Niagara Alkali Co. ..... Insert between pages 912 and 913

Oil States Petroleum 1057
Oldbury Electro Chemical Co. 1068
Onyx Oil & Chemical Co. 941
Otis-McAllister Co. 1000

Pacific Coast Borax Co. 1038
Patterson-Kelley Co. 1011
Pennsylvania Coal Products Co. 1022
Perry Equipment and Supply Co. 1063
Peters Chemical Manufacturing Co. 1062
Petroleum Specialties, Inc. 1069
Pfizer, Charles, & Co., Inc. 934
Phelps-Dodge Mfg. Co. 1057
Philadelphia Quartz Co. 1028
Pittsburgh Coal Carbonization Co. 1049
Pittsburgh Plate Glass Co., Columbia Chemical Division 993, 1027
Polachek, Z. H. 1066
Porter, H. K., Co. 1072
Portland Chamber of Commerce 938
Powell, William, Co. 1015
Precision Scientific Co. 1010
Prior Chemical Corp. 939

Quaker Oats Co. 1035

Radio Receptor Co., Inc. 1009
Raymond Bag Co. 1075
Reichhold Chemicals, Inc. 940
Reilly Tar & Chemical Corp. 1001
Rosenthal, H. H., Co. 1052

Saranac Machine Co. 1009
Sharples Chemicals, Inc. ..... Insert between pages 936 and 937
Sharma, M., & Co. 1049
Shell Chemical Corp. 933
Signode Steel Strapping Co. 1013
Snell, Foster D., Inc. 1066
Sobin, Irving M., Co., Inc. 1062
Solvay Sales Corp. ..... Inside Front Cover
Standard Alcohol Co. 1043
Standard Oil Co. (Indiana) 1049
Stanhope, R. C., Inc. 1064
Starkweather, J. U., Co. 1062
Stauffer Chemical Co. 949
Sundheimer, Henry, and Co. 1045
Swope Oil & Chemical Corp. 1057

Talk-A-Phone Mfg. Co. 1047
Texas Gulf Sulphur Co., Inc. 942
Trent, Harold E., Co. 1014
Turner, Joseph, & Co. 932

Ultra Chemical Works, Inc. ..... 930 and 931
Union Carbide & Carbon Corp. 925
Union Standard Equipment Co. 1065
U. S. I. Industrial Chemicals, Inc. ..... 943; Insert between pages 1020 and 1021
U. S. Potash Co. 1000
U. S. Stoneware Co. 1036

Van Range, John, Co. 1061
Velsicol Corp. 935
Victor Chemical Works 991
Virginia-Carolina Chemical Corp. 944

Welch, Holme & Clark Co., Inc. 912
Wellman Engineering Co. 1057
Westvaco Chlorine Products Corp. 905
Winthrop Chemical Co. 1045
Witco Chemical Co. ..... Back Cover
Witco Chemical Co., Franks Stearate Div. 1052
Wyandotte Chemicals Corp. 946

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Sole Agents

"WE" – EDITORIALLY SPEAKING

LAST MONTH we reported that yeast nucleic acid makes mice live longer. This month we report that "some types of radiation dosage caused rats and mice to grow old rapidly and to die of 'old age' while still young." It's getting so a mouse doesn't know from one minute to the next whether he's a candidate for the Old Mice's Home or for a cheese spree with the young bucks.

FIE ON YOU pessimists! Away with your Cassandra prophecies of Man's dissolution and civilization's demise! In a twinkling of an eye, relatively speaking, you can have orchid or baby blue tires for your automobile.

First the wheel, then chocolate eclairs, and now baby blue tires. *Ad astra per aspera,* or something.

Major premise: Ragweed causes hay fever.

Minor premise: 2,4-D kills ragweed.

Conclusion: 2,4-D is a cure for hay fever.

THE FALLACY of this reasoning may not fool you, but it has fooled enough people so that the Department of Agriculture has issued a statement that "the Department has not spoken of 2,4-D as a drug and has not suggested it as 'an aid in the cure of hay fever'."

PURSUING OUR proclivity to etymological excursions, we looked up "editor" this month. This noble word, we learned, is derived from the Latin *e,* out, and *dare,* to give. The derivation is obvious: we give out completely after each issue!

WE LIKE THE WORD R. L. Murray used to describe the genius of the redoubtable Germany acetylene expert, Dr. Reppe: "chemagination."

IN THE MAIL the other day we received a folder from the U. S. Rubber Co. telling us about the rubber maps they made for our armed forces. What a boon, we reflected, for the weary city-dweller resting from his moil and toil amidst the bucolic charms of the country. All he has to do is to stretch his rubber map and prove with a ruler that he's a thousand miles from nowhere.

A CERTAIN VALVE manufacturer speaks of a "large capillary" as one of the featured parts of his valves. Rather in the class of "young antiques" or "tall midgets", isn't it?

WE'RE HAPPY to see that some of the modern fiction writers take time to bone up on their chemistry. From "The Double Take," by Roy Huggins, ". . . round eyes that were the clear transparent blue of copper sulphate."

READER J. F. T. BERLINER takes us up on our invitation to "simplify" chemical nomenclature:

"The chemist should always be aware of the dangers of fulminic acid whose formula, usually written $(HONC)_2$ gives ample warning by saying 'HONC-HONC, get out of the way'.

"There is also the old one of writing borax Na_2O_7 because it is obvious that the Na_2 is B_4 the O_7.

"As an example of the reverse, the formula for water was, according to some long-forgotten teacher given as HIJK-LMNO which represents H to O.

"It would be of value to compile a list of simplifications that chemists have worked out to aid their memory for formulas, names or sequences of chemicals. As an example, the first letters of the names of organic dibasic acids in their natural order form the pronounceable and easily remembered word "Comsgap-sas" representing—carbonic, oxalic, malonic, succinic, glutaric, adipic, pimelic, suberic, azelaic, and sebacic acids.

"In the monobasic acid series, valeric acid beginning with a "V" is the fifth acid.

"There are many others sequestered in chemists' notebooks and minds which, if collected, would undoubtedly be not only of real value but most interesting and entertaining as well."

IT IS REPORTED that the yield of 2-pupene-α-methyl magusylide is increased 45 per cent when the reaction is carried out in a turbo-encabulator.

FIFTEEN YEARS AGO

(From our files of June, 1931)

Oil Chemists at annual meeting oppose joining the American Chemical Society.

The Texas Legislature raises the sulfur tax to 75 cents per ton.

Du Pont acquires sole ownership of Eastern Alcohol Corp. by buying out Dunbar Molasses Corporation's half interest. The other half has been owned by Du Pont since the organization of the alcohol firm in 1925.

The Supreme Court upholds President Hoover's oil conservation program by permitting the Secretary of the Interior to refuse prospecting permits.

Dry Ice Corporation's patent on the refrigeration of foodstuffs by solid carbon dioxide is held invalid by the Supreme Court. Earlier, the firm was enjoined from requiring users of the patent to buy dry ice from the corporation.

Manufacture of liquid gas, one of the more recent developments of the oil industry, is now being undertaken by the Union Oil Co.

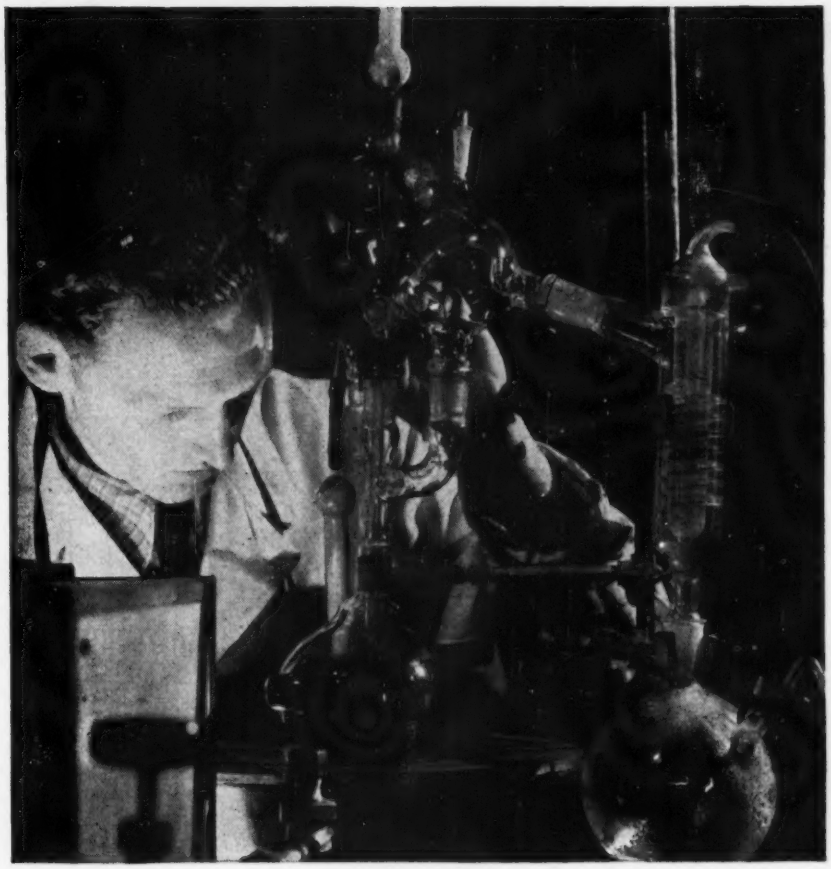
A number of the more important lacquer manufacturers are reported as having signed an agreement arranging for the formation of the Lacquer Patents Association, the chief purpose of which is to contest the patents of the Du Pont Company relating to low viscosity nitrocellulose lacquers.

THIRTY YEARS AGO

(From our files of June, 1916)

Congressman McCullough (R., Ohio) introduces a bill to create a United States Tariff Commission. John F. Queeny, president of Monsanto Chemical Co., objects to the stipulation in this and similar bills providing that members of the Commission be engaged in no other business. He contends that businessmen are preeminently qualified to serve and would be loath to give up their business to accept an appointment.

The Tupper Lake Chemical Co. has just completed the largest retorts in the country for the manufacture of wood alcohol, calcium acetate and charcoal. The two retorts have a capacity of 12½ cords each.



PURE Vitamins

—products of Merck Research

Merck research has been directly responsible for many important contributions to the synthesis, development, and large-scale production of individual vitamin factors in pure form.

In a number of instances, the pure vitamins may be considered to be products of Merck research. Several were originally synthesized in the Merck Research Laboratories, and others have been synthesized by Merck chemists and collaborators in associated laboratories.

Because most of the known vitamins have now been made available in pure form, effective therapy of specific vitamin deficiencies can be conducted on a rational and controlled basis, under the direction of the physician.

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MERCK & CO., Inc. *Manufacturing Chemists* RAHWAY, N. J.

MERCK contributions

1934—Ascorbic Acid Merck was made available by Merck & Co., Inc.

1936—Crystalline Vitamin B_1 was synthesized in the Merck Research Laboratories.

1937—Vitamin B_1 (Thiamine Hydrochloride Merck) was made commercially available.

1938—Nicotinic Acid Merck (Niacin) and Nicotinamide Merck (Niacinamide) were made available.

1938—Riboflavin Merck was the second pure crystalline vitamin to reach production during that year.

1938—Alpha-Tocopherol (Vitamin E) was identified and synthesized by Merck chemists and their collaborators in other laboratories.

1939—Crystalline Vitamin B_6 was synthesized in the Merck Research Laboratories.

1940—Vitamin B_6 Hydrochloride Merck (Pyridoxine Hydrochloride) became available.

1940—Alpha-Tocopherol Merck (Vitamin E) was made commercially available.

1940—Vitamin K_1 Merck (2-Methyl-3-Phytyl-1, 4-Naphthoquinone) was made available.

1940—Menadione Merck (2-Methyl-1, 4-Naphthoquinone), a pure compound having marked Vitamin K activity, became available.

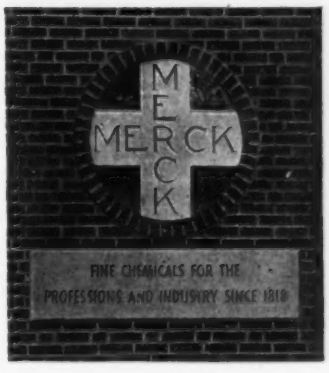
1940—Crystalline Pantothenic Acid, member of the Vitamin B Complex, was identified and synthesized by Merck chemists and their collaborators in other laboratories.

1940—The Calcium Salt of Dextrorotatory Pantothenic Acid was made available by Merck & Co., Inc.

1943—Crystalline Biotin, member of the Vitamin B-Complex, was synthesized in the Merck Research Laboratories.

1944—Biotin Merck was made available by Merck & Co., Inc.

Merck & Co., Inc. now manufactures all the vitamins commercially available in pure form, with the exception of vitamins A and D.



There is NO Substitute for a . . .

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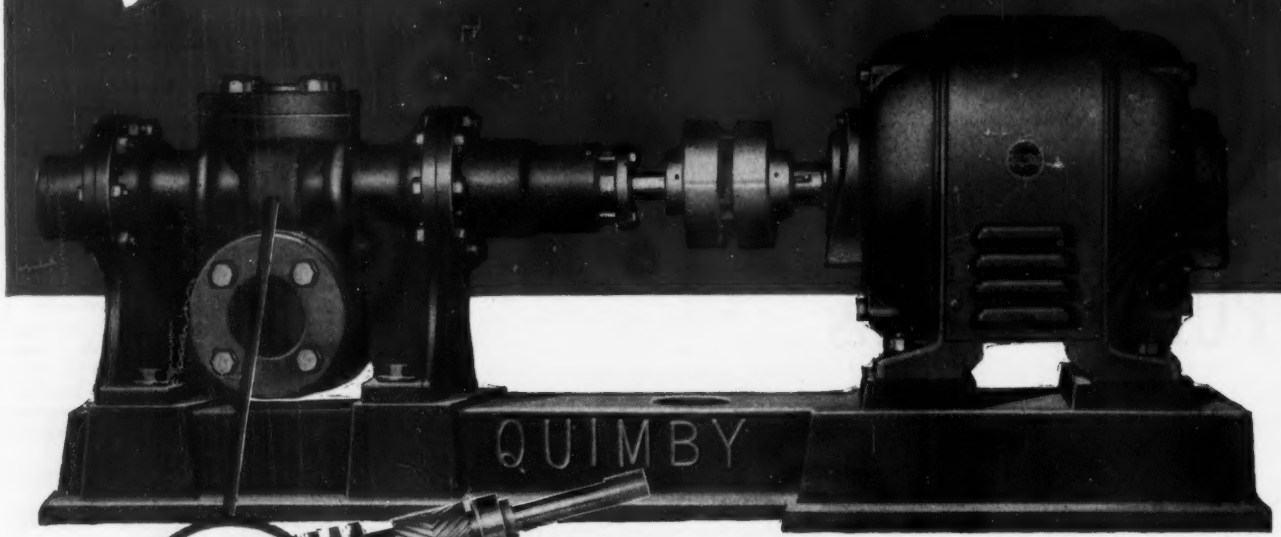

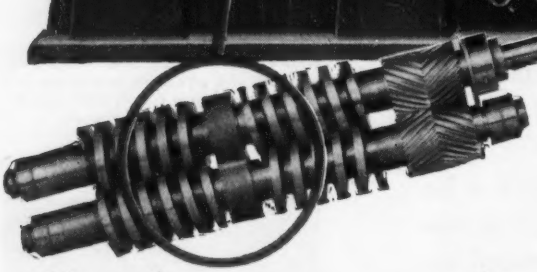

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PATENTS AND TRADEMARKS

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 583, Nos. 3, 4—Vol. 584, Nos. 1, 2 (Feb. 19-March 12)—p. 677

*Rubber

Creaming with hydrophilic colloidal creaming agent of synthetic rubber latex comprising aqueous soap emulsion polymerizate selected from butadiene-1, 3, methyl-2-butadiene-1, 3, etc., which comprises carrying out creaming operation in presence of hydrophilic colloidal creaming agent and alkali silicate. No. 2,393,261. Charles Peaker to United States Rubber Co.

Rubber glove comprising imperforate glove body having integrally attached a coating layer of porous latex rubber providing rough, non-slip surface. No. 2,393,298. Wallace DeLaney and Cornelius Crowley to The Seamless Rubber Co.

Reinforced tubing comprising inner flexible tubular structure of rubber or rubber-like composition, and outer continuous circular fabric sheath mounted thereon, composed of mono-filaments consisting of vinylidene chloride copolymer and plasticizer, filaments having oriented crystalline structure. No. 2,393,496. Theodore Stedman to The Firestone Tire & Rubber Co.

Separator for fine rubber particles carried in a liquid, which separator comprises a tank, etc. No. 2,393,498. Dewey Miller to The Firestone Tire & Rubber Co.

Transparent stencil for cutting letters, symbols and designs on surface by means of sandblasting and comprising abrasive resistant sheet formed of rubber and comminuted colorless base material, together with resilient dispersible filler to reduce cohesive strength of rubber, coating of transparent normally pressure sensitive adhesive on one surface of sheet and back-sizing layer of glue, ethyl cellulose or shellac on other surface. No. 2,393,668. Alfred Wartha to Minnesota Mining & Manufacturing Co.

Converting rubber to rubber hydrochloride comprising contacting rubber with gaseous hydrogen chloride in presence of penetrant in vapor phase. No. 2,393,870. Howard Reeves, Jr., and Troy Andrews to Bay Chemical Co. Inc.

Producing vulcanized rubber hydrohalide comprising reacting rubber in solid form with gaseous material selected from hydrogen chloride, bromide, and iodide in presence of penetrant capable of swelling the rubber. No. 2,393,871. Howard Reeves, Jr. and Troy Andrews to Bay Chemical Co. Inc.

Manufacture of cellular expanded rubber product which comprises lining mold with sheet of rubber, placing within mold a compound containing unvulcanized rubber and substance which evolves gas on being heated, etc. No. 2,394,122. James Urmston to Callender's Cable & Construction Co.

Making mold-vulcanized cellular article of rubbery material having impervious protective skin coating of rubbery material. No. 2,394,327. Paul Niessen and Alvon Cox to The B. F. Goodrich Co.

Building form for production of hollow articles from sheets of rubber-like material comprising hollow molded readily destructible form of fibrous material and a stiffening material, a fabric sheet adhered to external surface, and a layer of non-curing adhesive on external surface. No. 2,394,492. Elmer Scharenberg to The B. F. Goodrich Co.

Production of synthetic rubbers wherein mixture of polymerizable organic compounds, comprising butadiene and methyl isopropanyl ketone is polymerized in aqueous emulsion to form rubber-like product. No. 2,394,756. Robert Dreisbach to The Dow Chemical Co.

Composition comprising rubber from natural rubber and rubber-like polymers of butadiene, isoprene, piperylene and 2-chlorobutadiene, and monohydric alcohol ester of a tetrahydrophthalic acid. No. 2,394,815. Frank Soday to The United Gas Improvement Co.

*Specialties

Coagulant for removing dissolved or suspended matter from liquids comprising ferric chloride and gelatine. No. 2,393,269. Willem Rudolfs and Harry Gehm to The Permutit Co.

Emulsion introduction system for electric emulsion breakers. No. 2,393,328. Francis Mahone to Petrolite Corp. Ltd.

Printing with moisture repelled, greasy, printers' ink with non-hygroscopic gelatin surfaced thin water absorbent wet strength paper printing plate having superficial printing image of hardened gelatin on and surrounded by unhardened ferrogelatin background. No. 2,393,378. Edward Jahoda and Carlos Wittenmyer to Walter Fuchs.

Making soap from sperm oil which comprises heating sperm oil having high fatty alcohol content with anhydrous alkali to simultaneously saponify fatty acids of sperm oil and to transform fatty alcohols of sperm oil into soap. No. 2,393,421. German Schmidt and Carlos Edwards to Compania Industrial.

Fire extinguishing agent consisting of three parts powdered talc to one part casein powder by weight. No. 2,393,477. William Orman to Northrup Aircraft, Inc.

Thermoplastic road marking material having same co-efficient of expansion and contraction as road surface, material consisting of marble dust, amorphous wax, resin, castor oil, titanium dioxide and wood flour. No. 2,393,525. Francis Farrel to Martin Lindabury and Glenn Lindabury, as H. R. Lindabury & Sons and New Jersey Fence Co.

Detergent mixture of hydrocarbon-substituted aromatic sulfonates having at least 7 carbon atoms and average of 10 to 19 carbon atoms in hydrocarbon radicals introduced by alkylation, etc. No. 2,393,526. Lawrence Flett to Allied Chemical & Dye Corp.

* *Continued from Vol. 582, Nos. 4, 5, Vol. 583, Nos. 1, 2.*
(Continued on page 1075)

Patents Available for License or Sale

The Patent Office is regularly publishing a Register of Patents Available for Licensing or Sale. Patents concerning chemical products and processes appear below.

April 23, 1946

Pat. 2,339,922. **Fluid Level Indicator for Pressure Boilers.** Patented Jan. 25, 1944. Provides visual indication of water level without use of gage glass. Device at point of ordinary gage comprises a hollow tube containing water having a hollow magnetic ball floating on the surface of the water and a permanent magnet in position to follow the ball to indicate the water level. Few drops of water within ball when vaporized provides internal pressure to protect it against boiler pressure. Modification shows several magnets actuating electrical means to light water level indicating lamps remote from boiler. (Owner) Elbridge Gatewood, 410 Riverside Drive, New York 25, N. Y. Groups 33—64; 35—65; 36—13. Reg. No. 2,606.

Pat. 2,367,278. **Sugar-Cane Feeder.** Patented Jan. 16, 1945. Continuous delivery of a layer of uniform thickness is accomplished by a pivotally hanging gage plate near inlet end of chute which scrapes over and levels feed blanket as it slides downwardly along chute for delivery to first mill and crusher rolls. Speed of motor operating conveyor is controlled by angular movement of the plate so that conveyor feeds adjusted supply of cane to the rotary shredder. (Owner) Allen M. Hewlett, c/o Hutchinson Sugar Plantation Co., Naalehu, Kau, Hawaii, Territory of Hawaii. Groups 20—61; 35—51. Reg. No. 2,607.

Pat. 2,376,694. **Automatic Diverter for Sugar Contaminated Condensates.** Patented May 22, 1945. Sugar is detected in the condensate during process of manufacture by using high voltage alternating current which passes between spaced electrodes in condensate and acts through a relay to actuate valves to divert and prevent condensate from going to feed water supply. Also operates a signal as long as contamination continues. (Owner) Allen M. Hewlett, c/o Hutchinson Sugar Plantation Co., Naalehu, Kau, Hawaii, Territory of Hawaii. Group 35-51. Reg. No. 2,608.

Pat. 2,047,977. **Seal for Containers.** Patented July 21, 1936. For glass jars or metal cans with closures which turn or lift off. A sealing gasket of rubber-like composition, containing a lubricating material, provides a non-adhesive anti-frictional sealing surface. Preparation of sealing compositions described in patent. (Owner) Dewey and Almy Chemical Co., Patent Dept., 62 Whittemore Ave., Cambridge 40, Mass. Groups 20—33; 30—31; 32—21; 35—51. Reg. No. 2,610.

Pat. 1,877,744. **Liquid Prism.** Patented Sept. 13, 1932. Reg. No. 2,628.

Pat. 1,963,127. **Prism.** Patented June 19, 1934. Reg. No. 2,629. In the two patents listed above a liquid prism is substituted for the usual solid prism so that prisms of any size may be constructed. Consists of a container with transparent sides and ends filled with a transparent multiple refracting liquid. A hollow core having partitions made of a multiple refracting material is placed within the container. The partitions act to form wedge-shaped sections (similar to an optical prism). An energized coil produces an electrostatic field in the liquid which acts to control a steady beam of light directed through the liquid. In Patent 1,963,127 a single partition is used and two sides of the container are made opaque. Two "windows" are placed on opposite sides, one covered with a refracting material, the other with a glass. A mirror doubles the volume of light by reflecting light in a path parallel to the light being directed through the prism. "Prisms" may be used in series as a scanning element in a television screen or as refractometers or polarizers. (Owner) Delamere B. Gardner, 1625 South Wilton Place, Los Angeles 6, Calif. Group 36—61.

The following patent, owned by the United States Government, as represented by the Secretary of the Interior, is available for licensing, upon a non-exclusive, royalty-free basis:

Pat. 2,395,902. **Electronic Chronoscope for Measuring Rates of Detonation.** Patented Mar. 5, 1946. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757.) Device employs the time voltage relationship of a series resistance-capacitance circuit which may be used to measure rates of detonation in laboratory or field, of cased or unconfined charges. Has a precision of plus or minus 5% for time intervals at least as short as 1/10000 of a second, being preferably adapted to the measurement of time intervals as high as a millisecond. Has advantage over former electronic apparatus which was of a fragile and non-portable nature. Groups 28—84; 33—X2; 35—33. Reg. No. 2,635.

(Continued on following page)

(Continued from preceding page)

April 30, 1946

Pat. 2,179,932. **Package for Attachment to Shower Nozzles.** Patented Nov. 14, 1939. A bag of porous material contains bath salts or crystals for ready attachment to a shower nozzle to treat water as it sprays from shower. Bag is retained by means of a coiled spring or elastic adapted to fit various sizes of spray heads and withstand pressure. (Owner) Irene M. Hartman, 1497 Westvale Ave., Akron, Ohio. Groups 23—94; 28—32. Reg. No. 2,643.

Pat. 2,308,152. **Rapid Drying Oil Having Conjugated System from Soy Bean Oil.** Patented Jan. 12, 1943. Treatment of soy bean oil by oxygen gas oxidation and dehydration to produce a quick drying oil with characteristics closely resembling China wood oil. Product has excellent color retention, water resistance, and good pigment wetting properties and may be blended with other oils or used to make odorless and colorless varnishes, printing inks, linoleum, etc. Process recited in patent. (Owner) Paul D. Boone, 804 Washington Bldg., Washington, D. C. Group 28—23. Reg. No. 2,644.

Pat. 2,301,457. **Magnesium Extraction Process.** Patented Nov. 10, 1942. The production of commercially pure magnesium compounds and other salable products from uniformly burned dolomite, magnesite and other ores which produce magnesium oxide. The process uses a rotary kiln instead of the shaft kiln usually used, which, because the temperature of burning is controlled, produces a lightly burned, finer hydrated powder free of dead burned particles. The inventor states the lower cost of production makes products commercially competitive with sodium compounds now used in lieu of magnesium compounds. (Owner) Samuel P. Sadtler & Son, Inc., 210 S. 13th St., Philadelphia 7, Pa. Group 34—15—39. Reg. No. 2,645.

Pat. 2,391,951. **Water Softening Material and Method of Preparing Same.** Patented Jan. 1, 1946. Waste coffee grounds, by means of a simple process are converted into an effective water softening material. The process may be varied. Basically, however, the grounds are acidified in a solution containing a metallic salt, roasted, impregnated with an alkaline alkali metal solution, and neutralized with water. The material is very light, weighing 37 pounds per cubic foot. (Another water softener, i. e., "green sand" weighs 85 pounds per cubic foot.) The material may be renewed repeatedly by using a 2% solution of common salt. Readily used in the water softening apparatus of hotels, laundries, etc. (Owner) Svein Dahl-Rode, Box 2474 West Station, Oak Ridge, Tenn. Group 28—34. Reg. No. 2,651.

Pat. 2,280,168. **Process of Preparing Cuprous Oxide.** Patented Apr. 21, 1942. Cyclic process whereby certain of the original chemicals used may be repeatedly employed in preparing additional quantities of cuprous oxide. According to preferred procedure, a copper salt, advantageously copper sulphate, is allowed to react with a solution of sodium sulphite or other alkali metal sulphite. Inventor states process is simple, easily controlled, and relatively inexpensive. (Owner) William B. Stoddard, Jr., R. R. 4, Hamilton, Ohio. Group 28. Reg. No. 2,654.

Pat. 2,181,456. **Apparatus for Separating a Liquid from Solid Matters Suspended Therein.** Patented Nov. 28, 1939. Settling cistern consists of several funnel-shaped sections coaxially aligned forming chambers in which the separation of slimy liquids into a clarified liquid and sludge is accomplished by centrifugal action. The mixture is introduced at the lower part of the chamber in such a way as to give it a rotary and helical movement so that the clarified liquid follows the upper wall of the section and overflows into an encircling gutter and is withdrawn; the descending sludge slides to the bottom of the section and is discharged by means of a pump. Applicable to chemical and other industrial purposes. Leaflet on file. (Owner) Isak E. Johansson, P. O. Box 3126, Stockholm, Sweden. Group 35—69. Reg. No. 2,659.

May 7, 1946

Pat. 2,373,115. **Abrasion Resistance Testing Apparatus for Insulated Wire.** Patented Apr. 10, 1945. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757). A wire is passed at right angles to an abrading means at a progressively increasing speed and tension to ascertain the wear resistance qualities of the insulation to prevent its failure in ordinary fabricating processes. (Owner) Harold K. Graves, 28 Floral Terrace, Tenafly, N. J. Groups 35—69; 36—31. Reg. No. 2,677.

Pat. 2,241,621. **Method of and Means for Separating Gases from Liquids.** Patented May 13, 1941. Provides a unit for separating gas from liquid ammonia. Container has an inner and outer chamber formed by a plurality of apertured plates and rings alternately clamped together. As cold strong liquid ammonia from an absorber flows downwardly in the outer chamber, generally in a zig-zag course, it is progressively heated (releasing gas) by the inner chamber through which hot, weak liquid ammonia (heated by coils at bottom of container) is ascending.

Pat. 2,146,870. **Upholstery Stuffing Treatment and Product.** Patented Feb. 14, 1939. Loose mass of fibers or feathers are treated with a rubber solution. After dipping, excess solution is thrown off by centrifugal action to provide more uniform coating. Before drying they are wrinkled or corrugated by passing through a solvent chemical bath to increase surface friction at points of crossing. While still damp mass is subjected to a willowing or picking operation to separate fibers and prevent them from sticking together until substantially dry. The resultant fibers have great buoyancy and offer resistance to distortion and compression. (Owner) Edward O. Whiteley, 30 Church St., New York 7, N. Y. Group 22—93. Reg. No. 2,704.

Pat. 2,341,710. **Compressor or Pump.** Patented Feb. 15, 1944. Device for pumping gases is equally well adapted for pumping liquids, which are discharged under substantially constant, uniform flow without vibration, thus enabling device to be statically and dynamically balanced. Rotor mounted in a housing has an annular concentric groove into which fluid is introduced, and discharged. An abutment projects into the groove and a plurality of rotating, angularly spaced cylindrical vanes are slotted to pass over abutment during rotation of rotor and vanes so that as one vane passes over abutment an opposite vane will be crosswise of groove to momentarily block the flow. Compresses only against existant pressure, no pressure being built up within unit. (Owner) Harold M. Gingrich, Box 228, Roseburg, Oreg. Group 35—61. Reg. No. 2,705.

The following patents, owned by Hercules Powder Company, Wilmington, Delaware, are offered for license on reasonable terms:

Pat. 1,877,179. HYDROGENATED RESIN ESTERS AND METHOD OF PRODUCING. Patented Sept. 13, 1932. Reg. 2,707.

Pat. 2,051,796. HYDROGENATED RESIN ESTERS AND THEIR PRODUCTION. Patented Aug. 18, 1936. Reg. No. 2,708.

Pat. 2,130,997. PROCESS FOR THE TREATMENT OF ABIETYL COMPOUNDS AND PRODUCTS PRODUCED THEREBY. Patented Sept. 20, 1938. Reg. 2,709.

Pat. 2,138,211. PROTECTIVE COATING. Patented Nov. 29, 1938. Reg. No. 2,710.

Pat. 2,154,704. METHOD OF TREATING ROSIN ESTERS AND PRODUCT THEREOF. Patented Apr. 18, 1939. Reg. No. 2,711.

Pat. 2,201,237. COMPOSITION OF MATTER AND METHOD OF PRODUCING. Patented May 21, 1940. Reg. No. 2,712.

Pat. 2,322,197. ROSIN BASE RESIN. Patented June 15, 1943. Reg. No. 2,713.

Pat. 2,340,043. RESINOUS ESTER. Patented Jan. 25, 1944. Reg. No. 2,714.

Pat. 2,344,194. ROSIN BASE RESIN. Patented Mar. 14, 1944. Reg. No. 2,715.

Pat. 2,346,409. COATING COMPOSITION. Patented Apr. 11, 1944. Reg. No. 2,716.

Pat. 2,347,923. VARNISH COMPOSITION. Patented May 2, 1944. Reg. No. 2,717.

The eleven patents listed above have as their main objective the production of high grade coatings, such as varnishes, lacquers and the like, in which all, or some, of the oil used is of the inexpensive soft-drying type, such as linseed oil. The resultant coatings have all the desirable characteristics and are comparable with high grade coatings prepared with the fast drying oils, such as tung oil, etc. Group 28—11.

Detailed information may be obtained by addressing Hercules Powder Co., Wilmington, Del.

The following patents owned by the Hercules Powder Co., Wilmington, Del., have been dedicated to the public of the United States by instrument filed in the United States Patent Office which reads in part as follows:

* * * grants to the public of the United States, and each and every member thereof, including persons, firms, and corporations, the right to make, to use, and to sell to others to be used, in the United States, the inventions described * * * in said Letters Patent, without any liability under said Letters Patent to Hercules Powder Company * * * during the full term of said Letters Patent * * *.

Pat. 1,820,265. ESTER GUM AND METHODS OF PRODUCING. Patented Aug. 25, 1931. The production of a clear, quick-drying film by the reaction of a mono-basic acid (i. e. abietic acid) and a simple alcohol containing more than three hydroxyl groups (i. e. pentaerythrite). The mixture is heated within a range of 250-280° C., and the reaction facilitated by the use of a catalyst (such as powdered zinc), air being excluded during the heating by the introduction of carbon dioxide. The film has a hard finish and is elastic to a high degree. Group 28—11. Reg. No. 2,718.

Pat. 2,066,759. COATING COMPOSITION. Patented Jan. 5, 1937. Involves the use of ingredients such as ester gum of the character produced by reacting abietic acid with a tetra or higher polyhydric alcohol (pentaerythrite, etc.), together with a suitable solvent such as linseed oil heated to a temperature of 260-270° C. in the presence of a catalyst (such as boric anhydride) air being replaced by the introduction of carbon dioxide. Other ingredients such as litharge, lead linoleate, etc., may be added. The reaction results in the production of a clear film which may be used as a quick drying, durable varnish or lacquer. Group 28—11. Reg. No. 2,719.

Pat. 2,343,021. ROSIN BASE ESTER-DRYING OIL COMPOSITION. Patented Feb. 29, 1944. A "soft oil" such as linseed oil, soybean oil (not ordinarily used to produce varnishes) in contact with an oil-soluble rosin base ester of pentaerythritol is heated at a substantially high temperature of 575-625° F., to produce a hard, rapidly drying water-resistant varnish. Readily mixes with other varnishes, resins, drying oils, to produce compositions having a wide variety of properties such as gloss, alkali resistance, etc. Group 28—11. Reg. No. 2,720.

May 14, 1946

Pat. 2,197,347. GASIFYING APPARATUS. Patented Apr. 16, 1940. Generates combustible gas from liquid fuels, particularly low grade heavy fuel oils. Gasifies by burning a small percentage of the fuel in the presence of the remainder, atomizing and supplying oxygen thereto in such a manner that substantially all of the oxygen is united with the fuel burned to produce and deliver gas devoid of free oxygen, which may be piped or carried to a furnace unit or burner without danger of backfiring. Also, prevents the formation of carbon deposits in the gasifier. (Owner) The Eastern Oil Refining Co., Inc. Address correspondence to Henry D. Stoddard, Woodbridge, Conn. Group 35—69. Reg. No. 2,754.

Pat. 2,253,231. SENSITOMETER, ACTINOMETER, AND PHOTOGRAPHIC CHARACTERISTIC MEASURING SCALE. Patented Aug. 19, 1941. A transparent step wedge for measuring speeds and other characteristics of photographic materials, and actinity of light sources. (Owner) Philip A. Friedell, 1629 Telegraph Ave., Oakland 12, Calif. Group 39—12. Reg. No. 2,766.

Pat. 2,207,375. PHOTOGRAPHIC MEASURING AND CALCULATING SCALE. Patented July 9, 1940. For accurately measuring densities, opacities, transmissions of negatives, relative actinity of lights. Can be made to measure logarithmically increments as low as .0015. (Owner) Philip A. Friedell, 1629 Telegraph Ave., Oakland 12, Calif. Group 39—12. Reg. No. 2,767.

(*Continued from page 1073*)

Preparing colored albino asphalt aqueous emulsions, incorporating into albino asphalt a fade inhibiting agent selected from sulfur and chlorine. No. 2,393,574. Harry Sommer to Shell Development Co.

Intaglio printing ink resistant to "comic blocking" consisting of pigment dispersed in vehicle consisting of solvent and dissolved film-former selected from rosin-modified phenol aldehyde resins and rosin-modified phenol aldehyde resins admixed with ethyl cellulose, said solvent comprising petroleum naphtha and an oxygenated solvent for resin. No. 2,393,637. Wilbur Jones and Ernest De Lia to Inter-Chemical Corp.

As composition containing active chlorine, a solid mixture comprising Chloramine-B and acidic salt of alkali metal which contains ionizable hydrogen and in aqueous solutions of 0.25 gram per liter of the salt has pH not above 6. No. 2,393,716. Earl Smith to The Solvay Process Co.

Plastic cement comprising bituminous substance, volatile solvent for bituminous substance and fully spent clay filler, impregnated with petroleum fraction including polymerizable hydrocarbons, said filler material having been reacted with alkali metal hydroxide. No. 2,393,774. Arnold Hoiberg, William Ware, and Charles Wilch to Lion Oil Co.

High temperature grease consisting of petrolatum having dispersed therein lithium soap. No. 2,393,797. John Morgan to Cities Service Oil Co.

Paint and varnish remover comprising reaction products of nitropropane, normal methyl-amyl ketone, oleic acid, triethanolamine, pine oil, and water. No. 2,393,798. John Morgan and Russell Lowe to Cities Service Oil Co.

Turbine oil composition comprised of refined mineral oil and solution of sodium dichromate in tributyl phosphate, to inhibit corrosion of steam turbine parts. No. 2,393,799. John Morgan and Russell Lowe to Cities Service Oil Co.

Lubricant consisting of mixture of stearamide and glyceryl mono ricinoleate. No. 2,393,800. John Morgan and Russell Lowe to Cities Service Oil Co.

Electrical contact element including porous block of electrically conductive material, and mixture including alcohol ether and polyester formed by reaction of dihydric alcohol and aromatic dicarboxylic acid in said block. No. 2,393,816. Robert Savage to General Electric Co.

Composite panel to be adhesively connected to wall or other work surface and comprising front finish sheet of synthetic resin, coextensive backing sheet, formed of vulcanized rubber and ground cork particles, and embodying adhesive receiving rear face with contour simulating textile fabric, and coating of flexible and elastic rubber-rosin cement between two sheets. No. 2,393,843. Paul Van Cleef to Van Cleef Bros.

Polishing composition consisting of saturated solution of lime water containing zinc oxide. No. 2,393,844. Blanche Van Valkenburgh.

Composition in cream form for removing hardened coatings of fingernail lacquer, comprising polyethylene glycol having average molecular weight of 500 and liquid solvent. No. 2,393,864. Damon Francisco to Carbide and Carbon Chemicals Corp.

Stain removing composition comprising solid polyethylene glycol having average molecular weight 900 and water-soluble color stain-removing ingredient. No. 2,393,865. Helen Wassell to Carbide and Carbon Chemicals Corp.

Composition for removing tarnish from metals comprising water, abrasive particles, a polyoxyethylene diol having average molecular weight of 400, a tarnish-removing substance, and metal-wetting agent. No. 2,393,866. Helen Wassell to Carbide and Carbon Chemicals Corp.

Composition for etching and dampening planographic printing plates comprising aqueous solution of acid phosphate, nickel nitrate, a water-miscible glycol, and a water-soluble aldehyde. No. 2,393,875. Charles Van Dusen, Jr. to Addressograph-Multigraph Corp.

Insecticides. No. 2,393,925. Rupert Morris and Edward Shokal and William Thornhill to Shell Development Co.

Cutting oil base consisting of alkali metal rosin soap and mono ester of a fatty acid of 16 to 18 carbon atoms in chain length and member of class consisting of di and polyhydric alcohols. No. 2,393,927. Latimer Myers and Victor Muckerheide to Emery Industries, Inc.

Anti-seize paste composition for sealing metal joints exposed to action of gasoline, comprising polymerized blown castor oil insoluble in gasoline, soap selected from zinc and calcium soaps of saturated aliphatic acids, and neutral alkyl ester of ricinoleic acid with a saturated aliphatic alcohol. No. 2,393,393,929. Arthur Parker, deceased, by Helen Parker, executrix, to The Parker Appliance Co.

Mineral oil composition comprising mineral oil fraction having in admixture therewith oil-soluble product obtained by reacting phosphorus sulfide and amide of alkyl-substituted aromatic carboxylic acid. No. 2,393,934. Orland Reiff and Harry Andress, Jr., to Socony-Vacuum Oil Co. Inc.

Making adhesive, which comprises dissolving rosin in fatty oil acid, then incorporating mahogany soap, and mixing with vegetable proteinous material, and adding water, hydrated lime, and caustic alkali for dispersion. No. 2,394,043. Glenn Davidson.

Homogeneous hydraulic fluid consisting of material selected from sulfolanes and alpha-sulfolenes and as a balance a mixture of solvent and material selected from animal, vegetable and mineral oils, blown animal and vegetable oils, and alcoholysis products of oils and blown oils. No. 2,394,251. Rupert Morris, Edward Shokal, and Alva Snider to Shell Development Co.

Insecticidal composition comprising carrier and dihydroisophoryl thiocyanoacetate. No. 2,394,280. Paul Williams to Shell Development Co.

Producing capillary active agent which consists in adding alkaline salt of aliphatic carboxylic acid to alkaline aqueous solution of N-(3 aminobenzol-sulphonyl) benzamide, cooling, adding mixture of oelic acid

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CHEMICALS
THE RAYMOND BAG COMPANY
Middletown, Ohio

chloride and acetone, etc. No. 2,394,307. Winfrid Hentrich, Heinz-Joachim Engelbrecht and Erik Schirm.

Non-soap detergent comprising sulphonated organic compound having inorganic sulphur-containing radical and water-soluble inorganic phosphate, said composition providing clear aqueous solution which is color-stable and non-corrosive to iron-containing metals. No. 2,394,320. Russell McGhie to Colgate-Palmolive-Peet Co.

Preparing detergent compositions in iron-containing equipment comprising sulphonating organic compounds and neutralizing product, improvement which comprises carrying out neutralization in presence of material from phosphoric acids and water-soluble salts thereof. No. 2,3 4,-321. Russell McGhie to Colgate-Palmolive-Peet Co.

Dielectric composition consisting of halogenated diphenyl and a nitrated polynuclear aryl hydrocarbon. No. 2,394,367. Frank Clark to General Electric Co.

Making adhesive composition which comprises condensing phenol and furfural to form fusible, soluble, partially-condensed resinous product, etc., and finally adding solution of elastic vulcanizable rubbery material selected from natural and synthetic rubbers. No. 2,394,375. Malcolm Gross to The B. F. Goodrich Co.

Making pressure-sensitive adhesive which consists in heat reacting castor oil and polybasic acid selected from maleic acid, aconitic acid and itaconic acid, further heat reacting oil in inert diluent in presence of acetyl benzoyl peroxide catalyst with monomeric vinyl acetate to form a gel, introducing resin selected from rosin, hydrogenated rosin, ester gum and cumaroneindene. No. 2,394,440. Philip Gordon.

Dielectric fluid consisting of mixture of 4-chloro-1, 3-bis-trifluoromethyl benzene, and 5-chloro-1, 3-bis-trifluoromethyl benzene. No. 2,394,442. Paul Gross and Charles Bradsher.

Bonded abrasive article having supporting element and bonded abrasive body, supporting element secured to bonded abrasive body by tie bond layer containing mixture of polychloroprene and a phenolic resin. No. 2,394,478. James Prentice to The Corborundum Co.

Electric contact composed of mixture of finely divided particles of iron oxide and a metal having highly conductive oxide. No. 2,394,501. Paul Weiller to Square D Company.

Foundry core, particles of which are bound together by binder composed of chlorinated rubber and chlorinated paraffin with chlorine content of 70 per cent. No. 2,394,522. Henry Pace to Wingfoot Corp.

Hand covering comprising two or more preformed hand covering sections of non-plastic material, said preformed sections having marginal edges joined, heat responsive plastic water impervious bonding agent disposed between. No. 2,394,532. Joseph Shmikler to Illinois Glove Co.

Composition comprising hydrocarbon oil and to stabilize oil against oxidation, a compound having formula described in patent. No. 2,394,536. George Denison, Jr. and Paul Condit to California Research Corp.

Lubricating grease for chassis parts of crawler-type tractors comprising mineral lubricating oil, aluminum stearate, alkylated mononuclear phenol, polybutene. No. 2,394,567. Lorne Sproule and John Zimmer to Standard Oil Development Co.

High-testing or intermediate-testing glue consisting of glue from animal and fish glues, hydrophilic colloidal clay, and water. No. 2,394,682. Julius Brody, one-third to Bernard Proctor.

Insecticide composition comprising citrus sirup and calcium arsenate. No. 2,394,683. Ira Griffin and Caddis Morriss.

Lubricant having high film strength comprising mineral lubricating oil and sulfo-chlorinated and phosphorized fatty body from animal, vegetable and marine fats, oils and waxes, and chlorinated aliphatic hydrocarbon containing in excess of 85% of chlorine. No. 2,394,734. John Yule to The Pure Oil Co.

Preparing cutting oil stock. No. 2,394,735. John Yule to The Pure Oil Co.

Production of product suitable as varnish oil which comprises heating mixture consisting of castor oil and neutral ester of a mono-olefinic monohydric alcohol and a polybasic acid. No. 2,394,742. Franklin Bent and Clyde Ryan to Shell Development Co.

Heavy duty friction element for vehicular brakes comprised of mass of friction material, inert filler, and friction-modifying agent bonded with heat reaction product of mixture of initially unvulcanized synthetic butadiene 1, 3 acrylonitrile copolymer, sulphur, a vulcanization accelerator, and a heat-resistant phenolic-aldehyde resin. No. 2,394,783. Emil Keller and Ray Spokes to American Brake Shoe Co.

Low soap-content grease for ball bearing grease comprising soap selected from alkali metal soap of a saturated fatty material and alkali metal-alkaline earth mixed soap of a saturated fatty material, and to produce smooth consistency-stable grease, an oil soluble soap of a sulphonic acid, and mineral oil. No. 2,394,790. Hubert Liehe to Standard Oil Co.

Discrete agglomerate containing particles of finely divided acidic oxide ore bonded together with alkaline earth hydroxide and alkali metal carbonate. No. 2,394,793. Charles Maier to Pacific Bridge Co.

Detergent consisting of acyclic aliphatic ether having sulphonate radical connected with terminal alkyl radical on one side of ether linkage and lipophillic radical on opposite side of ether linkage. No. 2,394,834. Harland Young and Kurt Spitzmueller to Industrial Patents Corp.

Making greases which comprises dissolving saponifiable compound in mineral oil, dispersing saponifying agent in non-reactive liquid vehicle, mechanically comminuting agent and mixing solution of saponifiable compound and saponifying agent dispersion. No. 2,394,907. Wilfred Gallay and Ira Puddington to Standard Oil Development Co.

Lubricating composition comprising mineral lubricating oil and viscosity-index increasing amount of oil-soluble linear polyester reaction product of tri-isobutylene succinic acid and decamethylene glycol. No. 2,394,-909. Anthony Gleason to Standard Oil Development Co.

Killing weeds, which consists in applying substance from phenyl, naphthyl, tetralyl, and anthracene monocarboxylic aliphatic acids, their salts and esters. No. 2,394,916. Franklin Jones to American Chemical Paint Co.

Printing paste composition comprising vat dye, a thickener and a quinonyl sulphonamide. No. 2,394,918. Roy Kienle and Chester Amick to American Cyanamid Co.

Lubricant comprising lubricating oil and a salt of an alkyl xanthic acid. No. 2,394,954. Walter Watkins, Jr. to Standard Oil Development Co.

Manufacturing lubricating oils which are resistant to oxidation and sludge-formation, comprising contacting sludge-forming lubricating oil with hydrated inorganic ferric salt, etc. No. 2,394,965. Ernest Engelke to Cities Service Oil Co.

* *Continued from Vol. 582, Nos. 4, 5, Vol. 583, Nos. 1, 2.*

*Textiles

Coated fabric having strongly adherent coating comprising base coating having basis of organic acid ester of cellulose of low degree of esterification upon which is superimposed coating comprising organic acid ester of cellulose of higher degree of esterification. No. 2,393,302. Camille Dreyfus.

Producing sheets of felted fibrous cellulosic materials, which includes beating fibrous material in aqueous solution whose solute consists of 0.3% methyl cellulose. No. 2,393,553. David Musser and Harry Engel to National Cotton Council of America.

Production of artificial threads by projecting viscose through perforated nozzle into spinning bath containing sulphuric acid and metallic salt, whereby tendency of metallic salt to crystallize on unwashed thread is reduced. No. 2,393,595. Daniel Dawson to Courtaulds Ltd.

Recovery of wool from mixed textile materials containing wool and cellulose acetate fibers, which comprises immersing mixture in aqueous bath containing ethyl alcohol, sulfuric acid and hydrochloric acid, baking dried fibers, whereby cellulose acetate fibers are carbonized and wool fibers free of other textile materials are obtained. No. 2,393,712. George Seymour and George Ward to Celanese Corp. of America.

Production of permanently delustered crepe fabrics, steps of applying crepe twist to filamentary materials having basis of organic substitution derivative of cellulose and having incorporated throughout a polymerized ethylene oxide weaving crape twisted filamentary materials into fabric, and subjecting fabric to hot aqueous medium to cause crepe effect and permanent deluster. No. 2,394,212. Richard Sitzler and Joseph Bludworth to Celanese Corp. of America.

Manufacturing artificial fiber from protein contained in soybean. No. 2,394,308. Toshiji Kajita and Ryohei Inoue.

Manufacturing artificial fiber from protein contained in soybean. No. 2,394,309. Toshiji Kajita and Ryohei Inoue.

Formation of cellulosic materials by viscose process, which comprises extruding viscose into acidic coagulating liquid containing emulsified petroleum oil insoluble in coagulating liquid, permitting emulsified petroleum oil to form sludge with impurities in coagulating liquid and separating sludge from coagulating liquid. No. 2,394,519. Hayden Kline and Louis Fryer and Robert MacLaurin to Industrial Rayon Corp.

Stretching of artificial yarn which comprises spreading untwisted yarn comprised of synthetic, thermoplastic, filament-forming material to where all of filaments are separated and lie in same plane, passing spread yarn over heated rotating roll, and stretching yarn. No. 2,394,540. Theron Finzel to E. I. du Pont de Nemours & Co.

Producing shrinkage effects on textile materials having basis of lower aliphatic acid ester of cellulose, which comprises applying mixture containing methylene chloride and ethylene dichloride. No. 2,394,772. Frank Hill to British Celanese Ltd.

Manufacturing rayon, comprising passing incompletely regenerated viscose through bath of low acid concentration in which hydrogen sulphide is evolved, zinc sulphate being present to form zinc sulphide, etc. No. 2,394,957. Guy White to American Enka Corp.

*Water, Sewage and Sanitation

Treating algae to destroy same comprising contacting with algae on aqueous solution of water-soluble salt of a primary aliphatic amine. No. 2,393,293. Hoyt Corley to Armour & Co.

Sewage treatment. No. 2,394,413. James Walker to The American Well Works.

Manufacturing ice cakes free of liability of shattering upon rise in temperature after freezing, and increasing speed of freezing, which comprises imparting to water to be frozen a free carbon dioxide content. No. 2,394,647. Philip West to Board of Supervisors of Louisiana State University and Agricultural and Mechanical College.

Biochemical

Recovering sterols from yeast and like cellular material having saponifiable fats and other impurities therein in double extraction process. No. 2,395,115. Kenneth Goering to Anheuser-Busch, Inc.

Chemically modifying by iodine the feather-substance of body of feathers having capacity for developing objectionable odor. No. 2,395,271. Erik Havemann to Burton-Dixie Corp.

Manufacturing starch conversion sirup of notable sweetness and no discernible bitterness. No. 2,395,907. George Peckham, Jr. to Clinton Co.

Manufacturing stable starch conversion sirup of notable sweetness. No. 2,395,938. George Peckham, Jr. to Clinton Co.

Adding to spent distillers' mash a yeast autolyzing agent and substance containing Aspergillus oryzae enzyme. No. 2,396,234. Robert Allen and Frederick Timmer.

Cellulose

Manufacture of cellulose from cellulose-containing material, subjecting material to solution of caustic alkali, then hydrogen peroxide, in presence of aqueous acetic acid which contains manganese acetate, and then to aqueous solution of caustic alkali. No. 2,394,989. Henry Dreyfus; Claude Bonard administrator of said Henry Dreyfus, deceased.

Cuprammonium process in which regenerated cellulose product is formed in sodium hydroxide setting bath and then washed with water and dilute sulphuric acid. No. 2,395,015. Paul Schlosser, John Bennett and Kenneth Gray to Rayonier Inc.

Reducing solution viscosity of organic acid esters of cellulose which comprises washing freshly precipitated cellulose organic acid ester containing combined mineral acid with water having hardness of 20 parts per million and containing same mineral acid. No. 2,395,421. Richard Nebel to E. I. du Pont de Nemours & Co.

Nitrocellulose composition comprising nitrocellulose and reaction product of blown corn oil and material selected from phthalic acid, maleic acid and their anhydrides. No. 2,396,129. Ernest Rodman to E. I. du Pont de Nemours & Co.

Preparing improved cellulose ester in fiber form which comprises dry spinning solution, in organic solvent, of cellulose acetate crotonate having about 2.5 acetyl and 0.1 crotonyl groups per glucose unit, epsilon-thiocarprolactam, dibenzyl tetra sulfide and sulfur and heating resulting fiber. No. 2,396,165. Maurice Ernsberger and Arthur Gregory to E. I du Pont de Nemours & Co.

From Official Gazette—Vol. 583, Nos. 3, 4—Vol. 584, Nos. 1, 2 (Feb. 19-March 12)—p. 681

Ceramics

Crimped fibrous glass. No. 2,395,371. Stuart Dockerty to Owens-Corning Fiberglas Corp.

Producing cup-like articles from pulverulent material such as graphite, which comprises confining material in a pressure mold. No. 2,395,408. Josef Heuberger to Aktiebolaget Hammarbylampan.

Apparatus for forming glass tube with fine quality internal surface, comprising refractory mandrel, means for rotating mandrel, etc. No. 2,396,254. Samuel Everett to James A. Jobling & Co. Ltd.

Joint between ceramic part and ferrous metal part each having one surface exposed to same atmosphere, including member of soft non-ferrous metal and vitreous flux forming joint between parts. No. 2,396,320. Arthur Gaudenzi and Rudolf Risch to Aktiengesellschaft Brown, Boveri & Cie.

Making material for polishing glass which comprises heating finely divided, hydrated furnace-charge comprising proportion of iron pyrites under oxidizing conditions, cooling, etc. No. 2,396,398. Forrest Turbett to The Eagle-Picher Co.

In electric melting of glass, for overcoming dyeing action of reducing bodies which remain in molten glass, step of adding to materials already rendered oxidizing by addition of member of arsenious anhydride and antimony oxide, an oxide of zinc and cadmium. No. 2,396,585. Bernard Long.

Coatings

Coating composition comprising drying oil and hydrocarbon resin polymer selected from heat resin polymer and catalytic resin polymer of polymerizable hydrocarbons contained in hydrocarbon oil which has been physically separated from tar produced in vapor phase pyrolysis of petroleum oil. No. 2,395,076. Frank Soday to The United Gas Improvement Co.

Making wrinkle varnish base which consists in melting oil-soluble rosin-modified phenol-aldehyde resin in linseed oil, etc. No. 2,395,360. William Waldie to New Wrinkle, Inc.

Making wrinkle varnish base from natural resin and unblown drying oil. No. 2,395,361. William Waldie to New Wrinkle, Inc.

Producing variegated surface on porous material which comprises impregnating material with liquid solution of bleeding dye, evaporating liquid, and removing portion of dyed surface whereby undyed portions are exposed. No. 2,395,375. Harry Linzell to United States Gypsum Co.

Tastefree, flexible coating composition for sheet metal containers which has high chemical and water resistant properties, comprising phenol aldehyde resin which is heat convertible, plasticized and modified by a polyvinyl acetal resin of aliphatic aldehyde having formula R·CHO,R selected from hydrogen and alkyl radicals. No. 2,395,894. William May to American Can Co.

Preparing coating composition which has high chemical and corrosion resistance for application to surfaces of sheet metal containers, which comprises milling together, without use of solvents or softeners, water white, unsaponifiable and nonacidic cycloparaffine resin derived from hydrogenation of indene and coumarone resins and compatible, rubber-like, high molecular weight polymer of isobutene. No. 2,395,895. William May to American Can Co.

Preparing substances for use as varnish bases that form clear films upon thinning with solvents which comprises reacting an acidic resin containing free carboxylic acid groups with polymerized unsaturated oil having drying characteristics and containing saturated fatty acids and unpolymerized fatty acid substances partly in form of glycerides. No. 2,395,925. William Walton and John Eysenbach to The Sherwin-Williams Co.

Producing shellac substitute which includes providing dispersion in ethylenetetrachloride of salt of rosin from potassium and ammonium, and adding mixture composed of conc. nitric acid and of sulphuric acid. No. 2,396,608. Moses Rogovin.

Dyestuffs

Manufacture of azo dyestuffs comprising coupling a diazotised arylamine with a 2:4-diarylpyrrole. No. 2,395,135. Mordecai Mendoza and Maurice Rogers to Imperial Chemical Industries Ltd.

Water soluble dyes of anthraquinone series which dye animal fibers in brown shades and which are sulfonic acid compounds of 4-benzeneazoanilinoanthraquinone. No. 2,395,229. Arthur Lowe and Alan Robson to Imperial Chemical Industries Ltd.

Cyanine dyestuffs. No. 2,395,879. John Kendall and Douglas Fry to Ilford Ltd.

Chromable monazo dye. No. 2,396,343. William Reynolds and Swanie Rossander to E. I. du Pont de Nemours & Co.

Preparing indanthrene dyestuffs from beta-aminothraquinones by esterification of leuco anthraquinone to their disulfuric esters and oxidizing in aqueous medium, improvement which comprises producing disulfuric ester by reaction on beta-aminoanthrahydroquinone with sulfur trioxide compound of a tertiary amine. No. 2,396,582. Hans Lecher, Mario Scalera and Elizabeth Hardy to American Cyanamid Co.

Equipment

Joint which when part of vacuum-tight enclosure can withstand prolonged reheating at about 600° C. without becoming leaky, which comprises base nickel-copper alloys, element formed of beryllium and thin intervening layer of copper fused to and securing base and element together. No. 2,394,984. Gerard Claussen to Machlett Laboratories Inc.

Porous rigid dielectric metalloidal body characterized by honeycomb structure and density less than water, said body containing finely divided particles of metal of aluminum and magnesium bonded together with acidic resinous binder. No. 2,394,993. Henry Gardner.

Method of and apparatus for evaporating liquids and condensing vapors which comprises moving fluid to undergo change of phase through conduit, effecting change by heat exchange through walls of conduit, length of conduit being 1200 times its average hydraulic radius. No. 2,395,004. Robert Kleinschmidt to Arthur D. Little, Inc.

Furnace structure comprising vertical refractory side and end walls, vertical refractory partition wall disposed between and spaced from side walls to define combustion and mixing chamber on one side of partition and distributing chamber on opposite side. No. 2,395,091. Marion Barnes to Universal Oil Products Co.

Multi-stage fractionating condensation pump. No. 2,395,552. Merriam Johnson to Distillation Products, Inc.

Apparatus for effecting continuous activation of oxide gel comprising vertical channel formed of pair of closely spaced foraminous walls, etc. No. 2,395,632. Frederick Litty, Jr. to The Davison Chemical Corp.

Apparatus for conducting reaction between a liquid and a gas, comprising elongated vertically extending shell, vertically spaced transverse partitions dividing shell into plurality of superposed chambers, etc. No. 2,395,777. Austin Brunjes and Marcel Bogart to The Lmmus Co.

Fluid separator consisting of fluid system having inlet and outlet chamber with fluid flowing from former to latter, and means supplying inlet chamber with mixture of fluids of different densities at pressure higher than pressure in outlet chamber, etc. No. 2,395,855. James Fletcher to The Babcock & Wilcox Co.

Resistance thermometer arranged to measure heat flow through material along definite path. No. 2,395,192. Ralph Ostergren to Douglas Aircraft Co. Inc.

Cupola furnace for producing fused mineral matter by continuous process which comprises admixing mineral matter with carbonaceous fuel containing volatile matter. No. 2,395,231. William McNeil to United States Gypsum Co.

Salt dissolving apparatus comprising dissolving vessel provided with inner peripheral trough at its upper end, said trough having inner perforated wall, etc. No. 2,395,258. John Drake to Myles Salt Co. Ltd.

Making filter member having controlled degree of porosity, which comprises forming water and fiber bath, adding synthetic resin in water soluble stage, adding fine particles of inert material selected from diatomaceous earth, vermiculite, kieselguhr, and fuller's earth, and thoroughly mixing, controlling degree of porosity of filter member by regulating amount of inert material added to the bath, etc. No. 2,395,301. Edward Sloan to Jesse Hawley.

Method and apparatus for controlling reduction furnaces comprising determining reducing capacity of exit gases and modifying this reducing capacity in accordance with said determination by regulating introduction of reducing gas into furnace. No. 2,395,385. John Green and Joseph Vollrath to The Brown Instrument Co.

Apparatus for cleaning continuously moving indeterminate lengths of metal from coil thereof. No. 2,395,397. George Croft to Blaw-Knox Co.

Apparatus for electrolytic treatment of moving strips of metal. No. 2,395,437. William Venable to Blaw-Knox Co.

Mechanism for delivering fluid under pressure from closed container including jet formed integral with a sealing rod, etc. No. 2,395,439. Cecil Wilson and Adam White to Hoover Ltd.

Manufacturing electrical capacitors wherein dielectric layers are formed of vitreous composition having dielectric properties. No. 2,395,442. Kermit Ballard to E. I. du Pont de Nemours & Co.

In vapor and liquid drum, means beneath normal liquid level in drum dividing drum into a plurality of sections, one of sections having discharge means in communication therewith, etc. No. 2,395,873. Robert Jones, Albert Foster and Edward Kilsby to Foster Wheeler Corp.

In combination with furnace for heating article to predetermined temperature in presence of air normally effecting oxidation of surface of article, a temperature indicating device responsive to radiations from defined area of surface of article heated, source of non-oxidizing gas, etc. No. 2,395,937. Alex Paalu to A. O. Smith Corp.

High-vacuum unobstructed path distillation apparatus adapted to cause distilland to flow in thin film by centrifugal force over heated vaporizing surface, comprising spiral-shaped, rotatable, vaporizing surface positioned between two condensing surfaces, and within closed casing, etc. No. 2,396,374. Kenneth Hickman to Distillation Products, Inc.

Apparatus for continuously determining and recording a property of substance passing through operation, at plurality of stages in process, that comprises means for determining property at each of stages in terms of electrical impedance. No. 2,396,420. John Hayward and Elihu Cooley; said Cooley to Engineering Laboratories, Inc.

Insulated container for liquefied gases and like. No. 2,396,459. Leo Dana to The Linde Air Products Co.

Fluid-testing apparatus and method consisting of transparent graduated tubular body providing chamber; means for entrapping fluid to be tested in chamber; first bead in chamber and having density less than that of said fluid and thus tending to rise therein; second bead in chamber and having density greater than that of fluid and thus tending to sink therein, etc. No. 2,396,470. Raymond Mortensen to Arnold Beckman.

Dehumidifier unit comprising elongated foraminous container, metallic tube disposed centrally of and extending full length of container, regenerable desiccating material between container and tube, and electric heating unit disposed within tube. No. 2,396,474. Joseph Riley to the Secretary of the Navy of the United States of America.

Apparatus for separating dust and like from gaseous or vaporous medium. No. 2,396,526. Axel Edvin Nilsson.

In heating apparatus for melting materials of low heat conductivity, an outer tank member open at top, inner vat member, etc. No. 2,396,578. George Kittel and Paul Wollner to Aeroil Products Co.

Explosives

Primer composition for initiating detonation of lead azide comprising lead peroxide, calcium silicide, zirconium, and sulphur. No. 2,395,045. George Graff.

In a rocket, combustion apparatus comprising separate tanks for combustible and oxidizing liquids, means to intermingle liquids and to produce continuous combustion thereof, etc. No. 2,395,113. Robert Goddard, one-half to The Daniel and Florence Guggenheim Foundation.

Combustion chamber for rocket apparatus using liquid fuel and liquid oxidizing agent. No. 2,395,114. Robert Goddard, one-half to the Daniel and Florence Guggenheim Foundation.

Manufacture of high density brisant explosive charges which comprises milling together explosive liquid nitric ester, nitrocellulose, kieselguhr, stabilizer, trinitrotoluene. No. 2,395,353. James Taylor and Samuel Davidson to Imperial Chemical Industries Ltd.

Preparing granulated explosive, which method comprises intermingling ammonium nitrate, starch, a carbonaceous combustible ingredient, and water, etc., and surface-coating grains with nitroglycerin. No. 2,395,367. Charles Bitting to Hercules Powder Co.

Nitration of hexamethylenetetramine to cyclotrimethylenetrinitramine which

comprises reacting former with conc. nitric acid containing ammonium salt selected from ammonium nitrate and ammonium sulfate, etc. No. 2,395,773. Joseph Wyler to Trojan Powder Co.

Nitrocellulose propellant powder containing polyalkylene glycol ester of open-chain monobasic carboxylic acid, to plasticize powder to render it capable of extrusion and to reduce flash upon firing of powder. No. 2,396,074. George Barsky to E. F. Drew & Co. Inc.

Blasting cap comprising base charge and single superposed charge comprising coherent aggregates comprising crystals of diazodinitrophenol intermingled with solid nitrated polyhydric alcohol of formula CnHn-2OH, said superposed charge characterized by burning instead of detonating when confined only by cap shell and of detonating when confined by insertion of fuse in cap. No. 2,396,152. Lawton Burrows to E. I. du Pont de Nemours & Co.

Food

Sherbet composition comprising aerating type stabilizer selected from gelatin, locust bean gum and sodium carboxy methylcellulose, and finely divided, dry milled oat product, having low starch and high protein content. No. 2,395,060. Sidney Musher to Musher Foundation Inc.

Stabilizing ice-cream composition consisting of combination of polyhydric alcohol ester having free hydroxyl group and finely divided, dry milled oat product. No. 2,395,061. Sidney Musher to Musher Foundation Inc.

Producing vinegar containing percentage of acetic acid in excess of twelve per cent. No. 2,395,510. Frederick Silbernagel to A. M. Richter Sons Co.

Balanced egg product stable at normal refrigeration temperatures, comprising liquid egg material from egg yolk and mixture of both egg white and egg yolk normally unstable at refrigeration temperatures, sugar to stabilize egg material, causing decrease in emulsifying properties of mixture, and partial ester of fatty acid and a polyhydric alcohol to restore emulsifying properties. No. 2,395,587. Everette Scott and Clinton Parsons to Industrial Patents Corp.

Preparing beverage which contains cocoa and milk and preserving same in hermetically sealed containers, which comprises providing water slurry of cocoa and hydrochloric acid, adding anhydrous disodium phosphate, and then adding milk. No. 2,396,265. John Jackson to American Can Co.

Preparing nutrient materials from potato starch which comprises adding to starch, skim milk powder and water to bring about gelatinization of starch. No. 2,396,592. Fredrik André Moller.

Inorganic

Treating phosphate of alumina clay to physically remove inert impurities. No. 2,395,219. Stapleton Gooch to Pembroke Chemical Corp.

Purification of aqueous solutions of halides of alkali metals and alkaline earth metals including magnesium, containing heavy metal compounds as impurities, which comprises precipitating heavy metal impurities while at a pH of not less than 7 by adding chlorite of alkali and alkaline earth metal chlorites. No. 2,395,221. Clifford Hampel and John Weiler to The Mathieson Alkali Works, Inc.

Producing porous spongy aluminum chloride catalyst of increased catalytic activity and which also contains metallic aluminum. No. 2,395,291. Robert Patterson to Phillips Petroleum Co.

Converting to a free halogen a hydrogen halide other than hydrogen fluoride present in mixture containing in addition contaminants in form of organic halides and hydrocarbons. No. 2,395,314. Donald Blumer to Phillips Petroleum Co.

Solid composition to be dissolved in acid to produce modified silicic acid sol, comprising organic hydrogen bonding donor compound and precipitated sodium aluminum silicate. No. 2,395,472. Herbert Fernald and Ralph Iler to E. I. du Pont de Nemours & Co.

Burning of sulphur. No. 2,395,483. Hector James to Imperial Chemical Industries Ltd.

Photometrically analyzing gas mixtures containing NO, step of treating gas mixture with aqueous solution containing chromic acid and sulfuric acid to prevent absorption of N_2O_3. No. 2,395,489. John Major and Edgar Thomas to E. I. du Pont de Nemours & Co.

Producing SO_3 from sulphuric acid sludge comprising mixing sludge with discrete particles of solid granular carbonaceous residue previously derived from process so that sludge is ristributed as film in individual particles of residue, etc. No. 2,395,503. Earl Ross and Cecil Wilde to Stauffer Chemical Co.

Preparing hydrous oxides containing silica gel, which comprises subjecting alkali metal silicate solution to heat treatment at superatmospheric temperature to promote rapid hydrolysis, etc. No. 2,395,524. Harry Weiser and Winfred Milligan to Houdry Process Corp.

Manufacturing potassium pentaborate octohydrate, which comprises adding potassium chloride and borax to water and carbonating resulting sludge. No. 2,395,566. Frank May to American Potash & Chemical Corp.

Manufacture of potassium tetraborate, steps of adding potassium chloride to liquor saturated with respect to potassium tetraborate tetrahydrate, precipitating potassium tetraborate tetrahydrate. No. 2,395,567. Frank May and Henry Suhr to American Potash & Chemical Corp.

Producing ferrous sulphate monohydrate from pickle liquor containing acid. No. 2,395,729. Dexter Edge.

Catalyst preparation comprising precipitating hydrogel of alumina and slightly soluble oxide of polyvalent, multivalent metal selected from molybdenum, chromium, and vanadium, effecting precipitation with concomitant production of volatile ammonium salt, drying hydrogel, grinding, mixing with hydrogels of silica and alumina. No. 2,395,836. John Bates to Houdry Process Corp.

Gas-absorbent material comprising dehydrated mixture of lithium hydroxide hydrate and sodium silicate. No. 2,395,842. Parry Borgstrom.

Degreasing of moist bone material consisting in subjecting animal bone material to 90° F. to 175° F. in closed container and further subjecting material to higher pressure inside than outside of said bone material. No. 2,395,900. Camillo Mueller.

Regeneration of solid catalyst contaminated with solid carbonaceous deposit. No. 2,396,157. Walter Claussen to The Texas Co.

Electrolysis of magnesium chloride fusions to which magnesium chloride is supplied as hydrous salt. No. 2,396,171. William Gardiner to The Mathieson Alkali Works, Inc.

Removing free hydrogen from air of electric battery compartment, which comprises passing air through heating zone to decompose its contained stibine, removing antimony freed by decomposition, passing heated air in contact with platinum black oxidation catalyst to oxidize free hydrogen content of air. No. 2,396,190. John Morgan and Percy Levitt to Cities Service Oil Co.

Heat insulating material comprising dried residue of slurry containing finely divided, monohydrated alumina which is reactive with hydrated alkaline earth oxide, fibrous material, water, and hydrated alkaline earth oxide. No. 2,396,246. Conral Callis to Armstrong Cork Co.

Treating crude titanium tetrachloride containing free chlorine gas which comprises admixing crude titanium tetrachloride with antimony and heating until chlorine gas contained in tetrachloride is converted to antimony chloride. No. 2,396,458. Sanford Cole and Walter Meister to National Lead Co.

Preparation of granular sodium arsenite product by interaction of sodium hydroxide and arsenic trioxide. No. 2,396,465. Errol Karr to The Pennsylvania Salt Manufacturing Co.

Preparing water-soluble silver halide preparation containing more halogen than corresponds to composition of simple silver halide and which can be diluted to any predetermined degree which comprises combining silver with excess of halogen over that required for simple silver halide. No. 2,396,515. Ignaz Kreidl and Werner Kreidl to Ludwig Jekels, John Heller and Ignaz Kreidl and Werner Kreidl.

Preparing pyrosulphuryl chloride which comprises reacting liquid sulphur trioxide, free from sulphuric acid, with sulphur monochloride, removing sulphur dioxide formed and purifying pyrosulphuryl chloride by distillation and condensation. No. 2,396,581. Napoleon Laury and Joseph Lombardo.

Medicinal

Proportioning vitamin oil in food product which comprises mixture of ingredients including granular constituent. No. 2,395,067. Alan Richardson to California Packing Corp.

Inhaler comprising frangible ampule containing vaporizable liquid and composite cartridge tightly enclosing ampule, said cartridge consisting of inner casing formed of blotting paper and outer casing formed of strip of moisture resistant paper. No. 2,395,109. Howard Fonda to Burroughs Wellcome & Co. (U.S.A.) Inc.

Brominated thyroid product. No. 2,395,372. Edgar Ferguson, Jr. to Van Patten Pharmaceutical Co.

Preparing sulphanilyl-amidine which comprises deacylating a p-acylaminobenzenesulphonylamidine with alcoholic mineral acid. No. 2,395,412. Charles Kwartler and Philip Lucas to Winthrop Chemical Co. Inc.

Preparation for protecting skin against light of short wave length containing non-crystalline, odorless, non-anesthetic, water insoluble ester of para amino benzoic acid and fatty alcohol from myristyl, cetyl, and stearyl alcohols. No. 2,395,665. Samuel Isermann and Ernst Ohlsson.

Making solid mono-calcium citrate dihydrate which comprises incorporating together water and solid material consisting of calcium reagent from calcium oxide, calcium hydroxide and calcium carbonate, and solid acid from anhydrous citric acid and hydrated citric acid, etc. No. 2,396,115. Richard Nicholls to Miles Laboratories, Inc.

Heterocyclic sulphonamido azo compounds. No. 2,396,145. Eric Askelof and Nanna Svartz and Harry Willstaedt to Aktiebolaget Pharmacia.

Ephedrine salt of racemic pantothenic acid. No. 2,396,477. Eric Stiller to Merck & Co. Inc.

Sterilizing preparation, effective agent of which is silver halide preparation which is adsorbed on carrier. No. 2,396,514. Ignaz Kreidl and Werner Kreidl to Ludwig Jekels, John Heller and Ignaz Kreidl and Werner Kreidl.

Metallurgy, Ores

Reducing iron ores containing nickel oxide and chromium oxide which consists in subjecting ores to sufficient reducing agent to reduce all of nickel and only portion of iron, but none of chromium. No. 2,395,029. Thaddeus Baily.

Gun barrel having corrosion-resistant, metallic coating covering breech end of bore, said coating tapering to negligible thickness within bore. No. 2,395,044. Walter Gorton.

Apparatus for determination of fluidity of molten metals and alloys which comprises resorvoir for molten metal, a spiral runway connected to reservoir, runway having plurality of outlets therein to indicate degree of fluidity of metal. No. 2,395,254. Eric Currie to The International Meehanite Metal Co. Ltd.

Permanent magnet alloy of aluminum-nickel-iron base type containing sulfur to improve grinding and sawing characteristics. No. 2,395,285. Wayne McKibben to The Indiana Steel Products Co.

Refining metals, which consists in depositing batch of mixture of powdered metal oxide of type that can be reduced by aluminum, and aluminum powder on rapidly moving film forming surface, in igniting powdered mixture and forming liberated molten metal into thin film by centrifugal action. No. 2,395,286, Joseph Merle.

Rapid nitriding for steel objects the properties of which are improved by surface absorption and retention of nitrogen. No. 2,395,329. Artemas Holden.

Degasifying molten metal containing metals of group of nickel, cobalt, iron, chromium, tungsten and molybdenum, which comprises treating metal with solid carbon dioxide to cause ebullition of metal. No. 2,395,458. Arthur Cape to Coast Metals, Inc.

Production of beryllium ore concentrate, which comprises subjecting ore to pretreatment to remove iron and then to mineral-concentrating treatment involving selective filming under acidic conditions of a desired constituent in presence of a soluble fluoride, a lnog-chain fatty acid and a long-chain alkyl amine salt. No. 2,395,475. Harold Gibbs and Henry Snedden to the Secretary of the Department of Interior of the United States of America.

Treating chromium-nickel stainless steel containing carbon and stronger-than-chromium carbide formers such as titanium, columbium, vanadium, etc., with its components that are ferrite formers proportioned to those that are austenite formers to cause production of inherently precipitation-hardenable stress-laden martensite or martensitic-like structure. No. 2,395,608. Robert Aborn to United States Steel Corp. of Delaware.

Additional patents on all other classifications from the above volumes will be given next month.

Abstracts of Canadian Patents

Collected from Original Sources and Edited

Requests for further information or photostated copies of the patents reported below should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada.

CANADIAN PATENTS

Granted and Published Jan. 22, 1946

Glyceride carrying a glycol phosphoric ester as an antioxidant. No. 432,619. Sol Shappirio.

Reacting one mole equivalent of cyanamide with at least one mole equivalent of glycidol in the presence of an inert diluent and recovering the product. No. 432,626. American Cyanamid Co. (Ralph V. Heuser, Walter P. Ericks).

Process of softening water by subjecting water to contact with a water-soluble glass consisting of a homogeneous fusion product analytically consisting of As_2O, P_2O_5 and MO wherein A is alkali metal and M is divalent metal selected from the group consisting of magnesium, calcium, strontium and barium. No. 432,637. Blockson Chemical Co. (Charles S. King).

Continuous process for decaffeinating coffee. No. 432,657. General Foods Corp. (Thomas M. Rector).

Water repellent coating composition comprising, a urea-formaldehyde-alkyd resin, carnauba wax and a wax such as "stanolind." No. 432,660. General Motors Corp. (Ralph Canter, Harvey D. Geyer).

Preventing formation of a foam on the stock feed of a paper-making machine, by adding an aqueous emulsion of a siccative oil. No. 432,672. The Institute of Paper Chemistry (Sidney D. Wells).

In the retting of bast fibres, the improvement which comprises disintegrating the cementing material bounding these fibres by exposure of an aqueous solution of a promoted chlorite. No. 432,677. The Mathieson Alkali Works (James F. White).

Process for the production of readily filterable slurries of neutral calcium hypochlorite crystals. No. 432,678. The Mathieson Alkali Works (Homer Louis Robson).

Concentrating soluble potash ores, by coarsely-crushing the ore to larger than flotation size, forming a pulp of such ore and removing the slimes therefrom, then fine-grinding the ore to flotation size and conditioning with flotation agents, and subjecting to froth-flotation. No. 432,681. Minerals Separation North American Corporation (Francis X. Tartaron).

Purifying monomeric styrene containing small amounts of oxidized compounds by adding thereto a quantity of an amine, and thereafter distilling. No. 432,686. Monsanto Chemical Co. (Earl W. Gluesenkamp).

Mild, nonirritating skin cleansing composition comprising sulphated oleic acid containing in excess of 13 per cent SO_3 and an alkali metal stearate. No. 432,690. National Oil Products Co. (Joseph Cunder).

Manufacture of new mixed aliphatic-aromatic substituted esters of estradiol by causing estradiol-3-monobenzoate to react with a n-butyrlating agent. No. 432,704. Society of Chemical Industry in Basle (Karl Miescher, Caesar Scholz).

Granted and Published Jan. 29, 1946

Device for the continuous dry gasification of calcium carbide in a rotating perforated drum, provided with a water-sprinkling device and enclosed by a full-cased drum. No. 432,742. Alfred Muller, Hans Hofer.

Method of producing a moulded plastic stereotype. No. 432,748. Lorne R. Cragg.

Method of making guanidine carbonate which includes the step of hydrolysis of dicyandiamide in an aqueous solution in the presence of sulphuric acid. No. 432,782. American Cyanamid Co. (George H. Foster, David W. Jayne).

Preparing guanidine by reacting guanidine nitrate with caustic potash in a medium of 95 per cent ethyl alcohol, filtering off the insoluble potassium nitrate and recovering guanidine from the filtrate. No. 432,783. American Cyanamid Co. (David W. Jayne).

As new compounds monopropylol cyamide, monobutylol cyanamide, mono-2, 3-dihydroxy propyl cyanamide. No. 432,785. American Cyanamid Co. (Water P. Ericks).

Preparing dicyclohexyl guanidine by reacting cyanogen chloride with cyclohexyl amine in an organic solvent. No. 432,787. American Cyanamid Co. (Ingenuin Hechenbleikner).

Resinous composition comprising the product of reaction of formaldehyde and a sulphamylanilino amino 1, 2, 4-triazole. No. 432,794. Canadian General Electric Co. (Gaetano F. D'Alelio).

Process of preparing a substantially pure, crystalline tocopherol product via the succinate. No. 432,834. Distillation Products Inc. (James G. Baxter, Robert W. Lehman).

Preparation of ethers of phenylmethylcarbinol and its homologues which consists in condensing an aryl-substituted mono-olefine with an alcohol in the presence of an acidic condensation catalyst. No. 432,837. The Distillers Co. Ltd. (Herbert Muggleton Stanley, Gregoire Minkoff, James Ernest Youell).

Manufacture of glycol derivatives by interacting an alkylene oxide with an organic compound containing at least one hydroxyl group in the presence of a small amount of hexamethylene tetramine. No. 432,838. The Distillers Co. Ltd. (Herbert Muggleton Stanley, Philip Eaglesfield).

As a new product, blown drying oil of the non-conjugated type having a conjugated system, insoluble in ethyl alcohol, soluble in petroleum solvents, and liquid at 25° C. No. 432,877. Raybestos-Manhattan, Inc. (Izador Jacob Novak).

Producing lactic acid by fermenting a lactose-containing solution with lactic acid bacteria in the presence of a food supplement containing readily available nitrogen. No. 432,878. Sealtest, Inc. (Robert P. Myers, Samuel M. Weisberg).

Granted and Published Feb. 5, 1946

Golf ball consisting essentially of cellulose acetate 60 to 85 per cent, plasticizer 15 to 40 per cent. No. 432,958. Hercules Powder Co. (Walter Ervin Gloor).

Therapeutic composition comprising a p-amino benzine sulphonamide compound and urea peroxide. No. 432,970. William R. Warren & Co. (Marvin Russell Thompson, Nicholas Joseph Accousti, Catherine Virginia Fisher).

Manufacture of organic compounds containing two cyanamide groups attached to an aliphatic residue by subjecting an aliphatic diamine to reaction with a cyanogen halide. No. 432,973. Camille Dreyfus.

Granted and Published Feb. 12, 1946

Impregnating cellulosic textile fibres with an aqueous solution containing a guanidine salt of a monoalkyl ester of an aliphatic dibasic acid so as to improve or modify the handle and other properties. No. 433,005. Courtaulds Ltd. (James Hutchinson MacGregor).

Moulding compound to be used in the manufacture of acid resisting articles comprising, hydrolyzed vegetable fibrous material plasticized with an organic thermosetting resin. No. 433,019. General Motors Corp. (Robert A. Daily, George K. Shroyer).

Treating a metallic selenium surface which comprises making the selenium a cathode in a selenium dioxide solution. No. 433,025. International Standard Electric Corp. (Arthur von Hippel, Mortimer C. Bloom, James H. Schulman).

Composition suitable for protecting metals from corrosion comprising an aqueous colloidal dispersion of a polycarboxylic acid having at least 16 carbon atoms. No. 433,034. Shell Development Co. (Harold J. Haffner, George A. Siegelman, George Hugo von Fuchsm).

Inhibiting internal corrosion in a ferrous metal pipeline carrying light liquid petroleum distillates by subjecting the pipeline to the inhibiting action of an aqueous solution of an alkali metal nitrite carried by the petroleum distillates. No. 433,035. Shell Development Co. (Aaron Wachter).

Improving the colour of partially esterified wood pulp obtained by digesting comminuted wood with a lower aliphatic acid by subjecting the partially esterified wood pulp to the action of a bath comprising a lower aliphatic peracid and a relatively concentrated lower aliphatic acid. No. 433,069. Camille Dreyfuss (Clifford I. Haney, Mervin E. Martin, Daniel L. Sherk).

Granted and Published Feb. 19, 1946

Waxing device comprising a frame having a recess in the under surface a liquid distributing pad secured to said under surface. No. 433,087. (Rolland Lachapelle).

Detergent composition in cake form possessing cleansing and sudsing properties similar to those of ordinary soap comprising as its essential components commercial sodium lauryl suphoacetate in intimate mixture with thiourea in proportions by weight ranging from 25.75 to 30.70. No. 433,105. Allied Chemical & Dye Corp. (Lester F. Hoyt).

Lining element for a ball mill composed of a dense, hard, wear-resistant fused casting resulting from solidification of a mixture of from 85-98 per cent of aluminous material composed predominantly of alumina, and from 2-15 per cent glass. No. 433,122. The Carborundum Co. (Raymond Calvin Benner, John Charles McMullen).

Organic seed, plant and soil protectant containing as an essential active ingredient 2,3-dichlor-1, 4-naphthoquininone. No. 433,129. Dominion Rubber Co. Ltd. (William Pieter terHorst).

Volatile liquid fumigant consisting of a liquid mixture of propylene chloride and methyl bromide, and a volatile liquid carrier. No. 433,130. The Dow Chemical Co. (William W. Allen, Joseph Carl Dawson).

Insecticidal composition comprising as an active toxicant a mixture of 10 parts by weight of di-(4-chlorophenoxy)-methane with from 1 to 100 parts by weight of a phenothioxin compound. No. 433,131. The Dow Chemical Co. (Curtis E. Dieter, George E. Lynn, Bernard J. Thiegs).

Pressure-sensitive adhesive tape coated with a pressure-sensitive continuous flexible coating composition containing mirocrystalline wax as a major ingredient. No. 433,142. Marathon Corp. (Charley L. Wagner).

Flexible fabric product impregnated with a moisture and wear resistant thermosetting material, hardened and then surface-finished by removal of coating of the hardened treating material. No. 433,162. Southern Friction Materials Co. (Howard Snow).

Alternating current rectifier comprising a base provided with a layer containing selenium, selenium dioxide, a halogen salt and approximately 0.4 per cent of antimony. No. 433,180. Union Switch & Signal Co. (Leslie E. Thompson, Alexander Jenkins).

Curing a polymerized vinyl chloride-vinylidene chloride plastic prepared from about 10 per cent to 25 per cent of vinylidene chloride and the balance vinyl chloride by incorporating an aliphatic amine subjecting to heat. No. 433,186. Wingfoot Corp. (Thomas Henry Rogers, Jr., Robeft Donald Vickers).

Improved process for the production of butyl alcohol and acetone from fermentable molasses mash. No. 433,189. Wisconsin Alumni Research Foundation (Elizabeth F. McCoy).

Weighting of synthetic linear polyamide by immersing in a solution of stannic chloride. No. 433,194. Camille Dreyfus (Arthur Lyem).

(To be continued)

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

419,542. National Starch Products, Inc., N. Y.; filed Apr. 28, 1944; Serial No. 469,780; for synthetic resin adhesives; since Mar. 9, 1944.

419,553. Willard T. Somerville, Elmhurst, Long Island, N. Y.; filed Nov. 28, 1944; Serial No. 476,991; for reflux condensers; since Oct. 26, 1944.

419,675. Rust Seal Corp., N. Y.; filed Nov. 4, 1944; Serial No. 476,119; used in coating of metals to prevent rusting; since Sept. 19, 1944.

419,693. Brickseal Refractory Co., Hoboken, N. J.; filed Sept. 28, 1945; Serial No. 489,099; for refractory coating for brick surfaces; since May 1939.

419,837. The O'Sullivan Rubber Co., Inc., Winchester, Va.; filed Apr. 11, 1944; Serial No. 469,237; for adhesive cements; since 1900.

419,840. Diamond Alkali Co., Pittsburgh, Pa.; filed Sept. 4, 1944; Serial No. 473,880; for chlorinated paraffin wax; since Mar. 5, 1943.

419,950. Arthur F. Couch, Bayard, Nebr.; filed Feb. 16, 1945; Serial No. 479,866; for insecticides and fungicides; since Jan. 2, 1945.

471,639. A. O. Smith Corp., Milwaukee, Wis.; filed June 24, 1944; for containers for storage of liquids and gas; since Jan. 6, 1941.

473,046. The American Crayon Co., Sandusky, Ohio; filed Aug. 8, 1944; for mordant for setting textile colors; since June 13, 1944.

474,424. Primrose House, Inc., N. Y.; filed Sept. 20, 1944; for detergent for washing textile fabrics; since July 17, 1944.

475,460. Refined Products Co., Lyndhurst, N. J.; filed Oct. 18, 1944; for compound used in place of fixing salts in last rinse in dyeing textile fabrics; since Mar. 1, 1940.

475,462. Refined Products Co., Lyndhurst, N. J.; filed Oct. 18, 1944; for plasticized resin emulsion to prevent shifting of weave during dye processing; since Feb. 1, 1943.

475,464. Refined Products Co., Lyndhurst, N. J.; filed Oct. 18, 1944; for alkyl aryl sulphonate agent active at low and high temperatures; since Aug. 1, 1939.

478,304. Aviation Research & Development Corp., Fredericksburg, Va.; filed Jan. 6, 1945; for compositions containing water, surface tension depressant and hygroscopic agent for producing bubbles; since Dec. 6, 1944.

480,431. Witco Chemical Co., Chicago, Ill.; filed Mar. 2, 1945; for petroleum asphalt product as softening agent in compounding of rubber; since 1929.

483,237. Selby, Battersby & Co., Philadelphia, Pa.; filed May 11, 1945; for cold applied stable emulsion of coal tar pitch as anti-corrosive protective coating; since Mar. 23, 1945.

483,327. Maluminum Flux Co., Detroit, Mich.; filed May 14, 1945; for flux; since Apr. 1, 1920.

483,760. Bol, Ltd., N. Y.; filed May 25, 1945; for photographic chemicals; since Nov. 1, 1944.

486,254. Hercules Powder Co., Wilmington, Del.; filed July 25, 1945; for solid resins of chlorinated paraffin; since July 13, 1945.

486,410. Hercules Powder Co., Wilmington, Del.; filed July 28, 1945; for rosin size; since July 14, 1945.

486,689. Lee H. Maybee, as Industrial Oil Co., Kansas City, Kans.; filed Aug. 3, 1945; for petroleum product as motor sludge solvent; since Mar. 13, 1944.

486,728. George Zackin, N. Y.; filed Aug. 4, 1945; for fur cleaning preparation; since July 19, 1945.

486,939. Dewey & Almy Chemical Co., Cambridge, Mass.; filed Aug. 9, 1945; for use as synthetic rubber; since July 23, 1945.

486,993. Koppers Co. Inc., Kearny, N. J.; filed Aug. 10, 1945; under 10-year proviso; for naphthalene; since Feb. 15, 1886.

487,558. International Lubricant Corp., New Orleans, La.; filed Aug. 25, 1945; for aluminum stearate and insecticides; since March 1937.

487,570. Nuodex Products Co. Inc., Elizabeth, N. J.; filed Aug. 25, 1945; for wetting and dispersing agents; since December 1944.

487,781. Industrial Chemical Products Co., Detroit, Mich.; filed Aug. 30, 1945; for mixture to clean and prepare metal for painting; since 1944.

487,870. Specialty Products Co., Jersey City, N. J.; filed Aug. 31, 1945; for synthetic wax used for sizing yarn; since Nov. 30, 1944.

488,254. The Bissell Varnish Co., Bridgeport, Conn.; filed Sept. 11, 1945; for paint and varnish remover; since Sept. 1, 1904.

488,280. Nuodex Products Co. Inc., Elizabeth, N. J.; filed Sept. 11, 1945; for driers, dispersing, bodying, and stabilizing agents; since 1924.

488,570. Carbide & Carbon Chemicals Corp., N. Y.; filed Sept. 17, 1945; for insect repellant; since July 20, 1945.

488,750. The Firestone Tire & Rubber Co., Akron, Ohio; filed Sept. 20, 1945; for molding powders composed of plastics, synthetic resins and/or chlorine-containing rubber compounds; since Oct. 21, 1941.

488,867. Resistoflex Corp., Belleville, N. J.; filed Sept. 22, 1945; for coating shoes to make them impervious to oils and solvents; since June 25, 1945.

489,148. Saverite Eng. Co., Los Angeles, Calif.; filed Sept. 28, 1945; for removal of sludge and carbon; since 1940.

489,149. Saverite Eng. Co., Los Angeles, Calif.; filed Sept. 28, 1945; for prevention of rust as coating in boilers and tanks; since April 1939.

489,207. Culligan Zeolite Co., Northbrook, Ill.; filed Oct. 1, 1945; for synthetic gel-type zeolite; since Sept. 7, 1945.

489,246. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed Oct. 1, 1945; for alkyl aryl sulfonates as surface active and wetting agents; since Aug. 21, 1945.

489,773. The Special Chemicals Co., Cleveland, Ohio; filed Oct. 10, 1945; for emulsified polyvinyl acetate as bulk liquid adhesives; since Mar. 16, 1945.

489,793. The Chemical Service Co., Baltimore, Md.; filed Oct. 11, 1945; for insecticides; since October 1937.

489,864. Grant Photo Products, Inc., N. Y.; filed Oct. 12, 1945; for chemicals in development of photographs; since Jan. 2, 1936.

490,312. George William Hudson, as Crafton Chemical Co., Richmond, Va.; filed Oct. 22, 1945; for insecticides; since June 15, 1944.

490,739. California Spray-Chemical Corp., Wilmington, Del., and Richmond, Calif.; filed Oct. 30, 1945; for parasiticides; since Sept. 4, 1945.

490,850. Organized Distributors Inc., Oakland, Calif.; filed Oct. 31, 1945; for insecticides; since Oct. 9, 1945.

490,989. Antiseptol Co. Inc., Chicago, Ill.; filed Nov. 3, 1945; for insecticides; since Aug. 5, 1935.

491,992. Monsanto Chemical Co., St. Louis, Mo.; filed Nov. 21, 1945; for synthetic tanning agent; since Oct. 1, 1945.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, Feb. 19-March 12.

RESYN
419,542

SURE-CROP
419,950

PERMA WET
475,464

ZACKINIZING
486,728

NUODEX
488,280

FLEXBOND
489,773

NO-FLUD
419,553

STRATOSPHERE
478,304

DAREX
486,939

6-12
488,570

DISENE
489,793

BLACK DIAMOND
480,431

WHITE TAR
486,993

Direx
489,864

A.O. Smith Way Smith
471,639

KOMUL
483,237

DURON
488,750

RUST SEAL
419,675

INTERNATIONAL
487,558

Craftcide
490,312

PERMISET
473,046

MALUMINUM
483,327

RESISTOFLEX
488,867

NUOMIX
487,570

Brickseal
419,693

CHEMISHEET
483,760

GAMTOX
490,739

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474,424

-INDUSTROSOLV-
487,781

PETROFLO
489,148

Tigress
490,850

CLORAFIN
486,254

SAVERITE
489,149

PERMA FIX
475,460

HERCULES
486,410

Re-Nu-Va
487,870

DETHRAZE
490,989

CULLITE
489,207

CHLOROWAX
419,840

PERMA SET
475,462

MD MOTOR DOCTOR
486,609

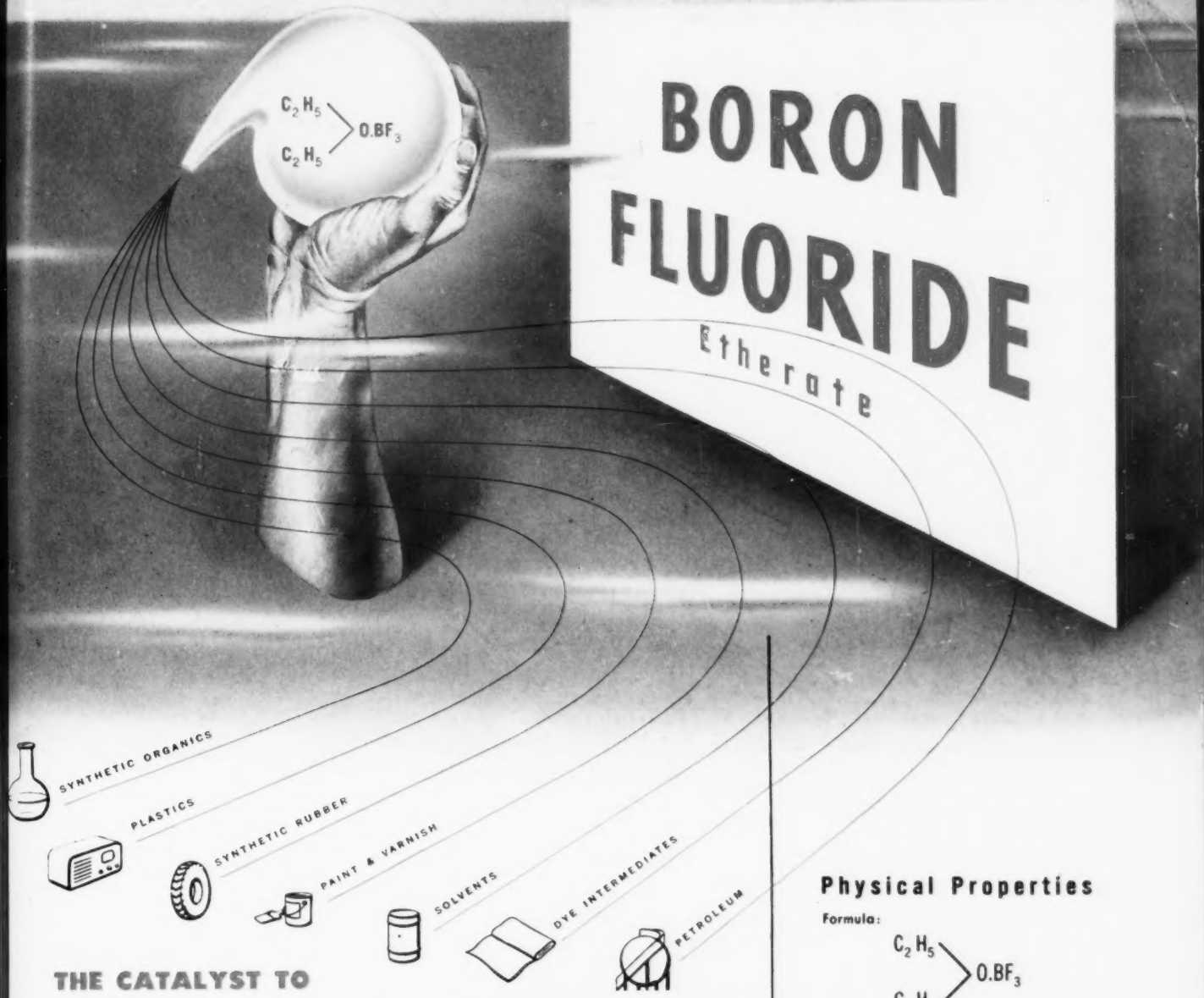
EZ
488,254

KREL
489,246

EXAN
491,992

G

General Chemical Fluorine Research Presents...



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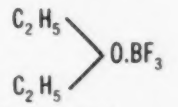
Outlined at right are some of the principal applications for BF_3 as a catalyst. Perhaps they indicate ways in which you can utilize a chemical of these characteristics in your development or production program.

Boron Fluoride Etherate is commercially available in drums. For full information, contact General Chemical Company, Fluorine Division, 40 Rector Street, New York 6, N. Y. When writing, if you outline your proposed application for this new catalyst, the technical experts of our Fluorine Division can work with you toward an early solution of your problem.

Physical Properties

Formula:



Mol. Wt.	141.9
Melting Pt.	Less than —60°C
Boiling Pt.	125°C
Spec. Gr.	1.14 at 25°C
%BF_3	47.8% min.

Some of the Principal Reactions Catalyzed by BF_3

1. Polymerization of unsaturated compounds such as olefins, diolefins, vinyl ethers, fatty oils, and terpenes. The products may be solid polymers useful as plastics or liquids as in the bodying of drying oils for paints and varnishes.

2. Condensation of aromatic nuclei with olefins and diolefins, paraffins, and olefins, and aromatic nuclei or olefins with acids.

3. As a cyclizing agent for rubber.

4. As an esterification catalyst.

5. As a catalyst in the synthesis of aliphatic acids from alcohols and carbon monoxide.

6. As a promoter and dehydrating agent in the sulfonation and nitration of aromatic compounds.

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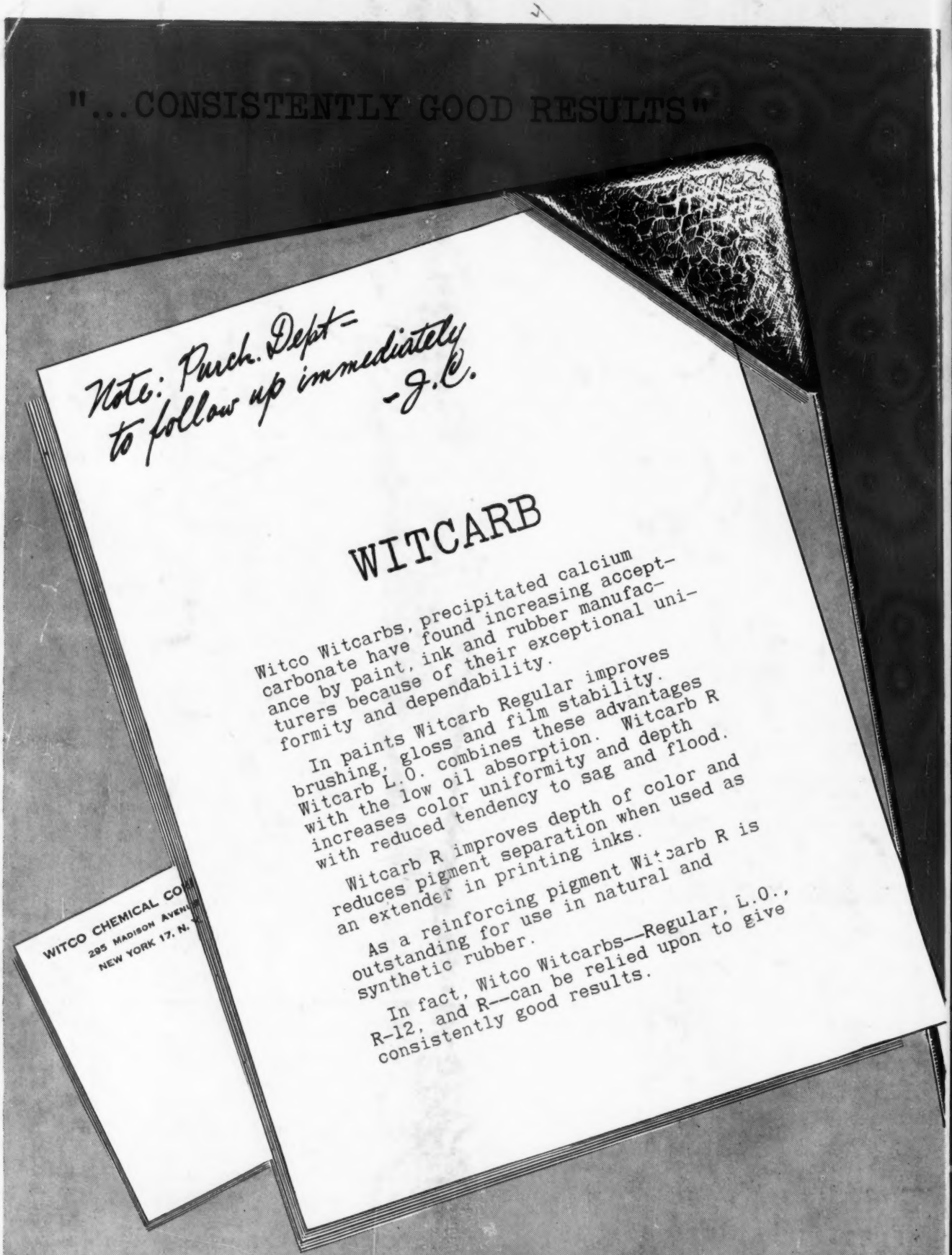
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In paints Witcarb Regular improves brushing, gloss and film stability. Witcarb L.O. combines these advantages with the low oil absorption. Witcarb R increases color uniformity and depth with reduced tendency to sag and flood.
Witcarb R improves depth of color and reduces pigment separation when used as an extender in printing inks.
As a reinforcing pigment Witcarb R is outstanding for use in natural and synthetic rubber.
In fact, Witco Witcarbs—Regular, L.O., R-12, and R—can be relied upon to give consistently good results.
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